The relationship between perceived maximum lifting ability, actual performance and self-rated health status.

by

Alexander Appah

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DEDICATION

To my love, Janda, whose love and support gave me the strength and reason to carry on.

To my father who left me with all the love he could give me, and for always believing in me and encouraging me to "finish hard" in everything I do.

To my daughter Brynn Ama, who brings so much joy to me.

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TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
II. LITERATURE REVIEW	2
A. Health and function	2
B. Measuring Functional Performance	3
C. Psychosocial factors and functional performance	5
D. Self-efficacy belief and functional performance	6
E. Summary	8
III. THEORIZED RELATIONSHIP BETWEEN VARIABLES	10
IV. RESEARCH METHOD	12
A. Sampling and design	12
B. Procedures	13
C. Measures	13
i) Physical ability estimation form	14
ii) SF-36 health survey	15
iii) Functional capacity evaluation	16
iv) Sickness Impact Profile	19
v) Pain Disability Index and Visual Analogue scale	19
D. Statistical analysis	20
E. Ethical consideration	21
V. HYPOTHESES	22
VI. RESULTS	23
A. Characteristics of subjects	23
B. Perceived health and disability	23
C. Perceived versus actual lift	24
D. Relationship between perceived ability and actual performance	25
E. The Relationship between absolute difference scores and perceived health	26
VII. DISCUSSION	27
A. Perceived health and the relative influence of perceived ability on actual performance	27
B. Characteristics of subjects	28
C. Perceived ability and actual performance	29
D. Limitations	31
VIII. CONCLUSION	32
APPENDICES	
A. References	39
B. Physical Ability Estimation Form	44
C. Subject Information Sheet (Study Group)	45
D. Subject Information Sheet (Control Group)	47
E. Subject Consent Form	49
F. Study Subject Data Sheet	50
G. Control Group Subject Data Sheet	51
H. Fitness for FCE Form (Control Group)	52

I. Therapist Information Sheet 53
J. Therapist Consent Form 55
K. Therapist Data Sheet 56
L. Recruitment Advertisement Form 57
M. Research Facility 58
N. Health Research Ethics Approval 59
O. Client Health Questionnaire (PAR-Q) 60
P. SF 36 Version 2 – Health Survey 61
Q. Pain Disability Index and Visual Analogue Scale 63
R. Sickness Impact Profile 64
S. Functional Capacity Evaluation 85
T. Raw Data 87

LIST OF TABLES

TABLE	PAGE
1. Comparison of the study groups on performance on the FCE measures	35
2. Comparison of the study groups on performance on the self-report measures	36
3. Subject characteristics	37
4. The Correlations between the summary scores of the Short Form 36 health survey and the Pain Disability Index and Sickness Impact Profile scores	37
5. Pearson correlation of perceived ability versus actual lift performance of the low back pain and control subjects	37
6. Pearson correlation of independent variables and absolute lift score	38

CHAPTER I

INTRODUCTION

Most Functional Capacity Evaluations (FCEs), standardized batteries of work-related tasks, report on the observed physical performance of work tasks from which inferences related to the worker's capacity to perform related activities in the workplace are made (Schonstein and Kenny, 2001). Review of the utility of FCEs in determining functional performance suggests that individuals undergoing FCE are likely influenced by multiple factors, including factors of the person and the physical environment, the activity performed, and rater judgment (Rudy, Lieber, and Boston, 1996). When functional performance is assessed, those factors related to the person and the environments are implicitly evaluated. These factors include the person's skills, abilities and motivation (Schonstein and Kenny, 2001), and the willingness of the individual participating in the FCE (Rudy et al., 1996). In addition, self-efficacy belief, an individual's belief in his ability to perform a behaviour or task, has been found to be associated to functional performance (Gibson and Strong, 1998; Carosella, Lachner, and Feuerstein, 1994; Lachner, Carosella, and Feuerstein, 1996; Lachner and Carosella, 1999; Burton, Tillotson, Main, and Hollis, 1995; Estlander, Vanharanta, Moneta, and Kaivanto, 1994; Gatchel, Polatin, and Mayer, 1995; and Hildebrandt, Pfingsten, Saur, and Jansen, 1997). It is also known that a change in health, particularly, the experience of low back pain is associated with perceived disability (Tait, Pollard, Margolis, Duckro, and Krause, 1987). However, there is very little known about the association between perceived health status and self-efficacy belief to perform lift tasks. The aim of this research was to study the relationship between perceived health and self-efficacy belief towards lifting in subjects with low back pain.

CHAPTER II

LITERATURE REVIEW

A. Health and function

The World Health Organization (WHO) defines health as more than the absence of illness (Wilcock et al., 1998). The WHO classifies human functioning and disability in terms of "states of health", and therefore, this definition is applicable to all people rather than just those who have a disease or illness (Stewart, 2002). The WHO International Classification of Functioning, Disability and Health (ICF) describes health and health-related states as a dynamic interaction between model components including body functions and structures, impairments, activity, participation, activity limitation, participation restrictions, and environmental factors (Stewart, 2002). Among these components that describe or influence health are the personal factors of the individual. A person's perception of health status can influence or determine their ability to engage in activities, as well as the level of performance that the individual displays. Also, performance can be indicated by the person's belief in their ability to function in the face of the change in their health. The components of health or health-related states are expressed in positive or negative terms to indicate the change in state of health. This continuum of health states suggests measurable changes, both quantitative and qualitative in nature.

Blaxter, (1990), found that people conceptualized health along a number of dimensions: physical functioning, energy and vitality, social relationships, being able to function, behavior aimed at a healthy lifestyle, having a reserve to

combat problems and psychosocial well being. These are demonstrable behaviors and perceived states that can be measured from observation, instrument or by self-report. Although there is no single tool that provides a comprehensive measurement of states of health, several tools have been developed with consideration of some or most of the dimensions of the ICF description of health and health-related states.

B. Measuring functional performance

The World Health Organization International Classification of Function describes performance as what an individual does in his or her current environment, which includes all aspects of the physical, social, and attitudinal world of that individual (Stewart, 2002). Functional performance is measured by observing the physical behavior of an individual while he performs a given task in a given environment. Thus, any behavior of the individual including body movements and physiological changes in the person can be measured during the performance. Functional Capacity Evaluation tools are used to determine the functional ability of an individual at a given time in order to make inferences about their future performance. In order to make a reliable and valid inference about future performance, all factors associated with the functional performance should be considered. These factors should also be measured during the FCE in order to strengthen the validity of the inference made.

Another approach to measuring functional ability or performance is through self-report. Reneman, Jorritsma, Schellekens, and Goeken (2002) observed little to moderate correlation between self-reported disability and performance-based measures. This finding is indicative of the gulf that can exist

between worker perceived ability and clinician-determined ability of a worker on an FCE tool.

Viikari-Juntura et al., (1996), reported that workers' judgments of self-reported physical workload showed low levels of reliability. The difficulty may be due to the individual's inability to determine a reference mark for physical ability (i.e. what it feels like to lift ten or thirty pounds). Wiktorin, Selin, Ekenvall, Kilbom, and Alfredsson, (1996), conducted a study to address this issue. The authors studied the ability of workers to reproduce simulated work forces correctly and to quantify these forces by means of self-report. The results indicated that the workers underestimated the weight of boxes lifted, and overestimated the force required to push and pull objects. This suggested that quantifying the ability to perform specific activities such as lifting is difficult. Even with training, subjects have difficulty reproducing work forces correctly. These findings reflect the fundamental studies on the relationship between perception of stimulus intensity and actual intensity conducted by Stevens (1959) which showed that individuals are unable to accurately estimate stimulus intensity.

Stevens (1959) conducted a comprehensive study on sensory communication from a psychophysical perspective to understand the perception of stimuli intensity versus actual intensity. In his study, Stevens found that the perception of heaviness (of lifted weights) versus actual lifted weights by healthy subjects produced a linear relationship with a diagonal slope and an exponent of 1.45. This indicates that the subjects reported weight levels that were higher than the actual weight of the material. Furthermore, this disparity between actual and perceived weight (or heaviness) increased disproportionately as a function of the actual physical magnitude of the objects' weights. This study showed that, in

general, healthy individuals inaccurately judge the heaviness of the weight they handle, and have a tendency to overestimate the heaviness of the material.

The framework of Stevens' study suggests the tendencies of healthy individuals when estimating a level of physical demand. The judgment of heaviness of a material formed through sensory experience with the material can be used as a reference to assist an individual to appraise the demand of a lift task. Furthermore, this experience can be associated with the individual's appraisal of his ability to perform a given task.

Our current understanding of how functional performance is determined suggests that a broader view of functional performance will be more beneficial. This indicates that assessment of function should consider all factors associated with it. These factors should be studied to gain a better understanding of its association with functional performance.

C. Psychosocial factors and functional performance

The involvement of psychological states and its influence on function is included in the bodily function and structure category of the WHO ICF (Stewart, 2002). The health and functioning of an individual is a dynamic entity that is thought to be associated with changes in the individual's physical and mental status, and the physical and social environment in which they live. They are psychosocial, physical and environmental factors. These associations may impact performance in isolation or as a group. Psychosocial factors are thought to be associated with functional performance (Rudy et al., 1996) in individuals with low back pain, however there is very little known of the nature of the association between functional performance and individual psychosocial factors.

This is because few studies in the peer-reviewed literature focus on the specific relationship between psychosocial factors and physical capacity in determining the ability of an individual with low back pain to perform a specific functional task. Scientific studies in subjects with low back pain have indicated that perceived disability (Gallagher et al., 1989; Feuerstein and Thebarge, 1991; and Gatchel et al., 1995) and self-efficacy belief (Carosella et al., 1994; Lackner et al., 1996, Kaplan et al., 1996; Lachner and Carosella, 1999; Kaivanto, Estlander, Moneta, and Vanharanta, 1995; and McKenzie et al., 1987, in Keough and Fisher, 2002) are psychosocial factors associated with functional performance. Our current understanding that psychosocial factors, as well as physical and environmental factors, are associated with functional performance indicates that the sole use of observed physical performance on an FCE to predict future performance may not be a valid approach. Innes and Straker (1999b) reviewed the validity of ten FCE assessment tools and concluded that the validity of all the tools was not known as there was no evidence in peer-reviewed journals to support any level of validity. Rudy et al., (1996) reviewed the use of FCEs and indicated that psychosocial factors within the functional capacity evaluation should be determined in order to gain a thorough understanding of the overall functioning of the individual. Therefore, a more reliable and valid conclusion of an individual's functional ability could be derived from a comprehensive assessment that considers all the factors associated with the individual's performance.

D. Self-efficacy belief and functional performance

A psychosocial factor that is gaining acknowledgement as a determinant of an individual's functional performance is self-efficacy belief (Gibson and Strong, 1998; Lachner and Carosella, 1999; and Kaivanto et al., 1995). Self-

efficacy is an individual's belief about his ability to perform a behavior or task (Jensen, Turner, and Romano, 1991, in Gibson and Strong, 1998). It describes the individual's confidence in initiating a given task and sustaining their performance of the task even against some difficulties (Lachner and Carosella, 1999). This process involves the individual's appraisal of his ability and the requirements of the given task.

Self-efficacy theory draws from social learning theory where cognitive processes (beliefs, attitudes), behavior, and environmental are seen as influencing one another to shape health behavior (Lachner and Carosella, 1999). Self-efficacy belief to perform a task involve cognitive processing of variables (Lachner and Carosella, 1999) such as the physical demands of a task, environmental structures such as height, as well as bodily functions and structures. The individual integrates these and other pertinent factors to establish self-efficacy belief towards these tasks.

This theory is aligned with the Model of Human Occupation (MOHO), where MOHO's concept of personal causation, the belief in one's ability to perform a task, plays an important role in the actual performance (Kielhofner et al., 1999). Also, it is supported within the Person-Environment-Occupation model where it is suggested that an individual's relationship with their occupation is transactional in nature (Law, et al., 1996).

Self-efficacy belief has been studied to identify its role in functional performance (Lachner, et al., 1996; Lachner and Carosella, 1999; Estlander et al., 1994; and Jensen et al., 1991). Lachner and Carosella (1999) studied 100 work-disabled patients suffering from low back pain, and concluded that self-efficacy expectancy accurately predicted lifting. Estlander et al., (1995), found that self-efficacy beliefs (i.e. the patient's belief in his or her capability to endure

physical activities) was the most powerful predictor of isokinetic performance by patients with low back pain.

In the current study, self-efficacy belief to perform lift tasks will be measured by asking subjects to record their perceived lifting ability. It is assumed that, along with other factors, past experience with handling materials would assist the subjects to determine the amount of weight they believe they can handle. The experience of pain is not found to be strongly associated with judgment of workload. Toomingas, Alfredsson, and Kilbom (1997) found no support for bias in reporting physical workload for patients with musculo-skeletal disorders according to pain experience. Even though the judgment of workload may remain the same with pain experience, the pain experience may be associated with an individual's judgment of their ability to perform a lift task. Tait, Pollard, Margolis, Duckro, Krause, (1987) reported that the experience of injury and associated pain is often linked to perceived disability. It is assumed that perceived health change would likely have an impact on an injured worker's judgment of his ability.

E. Summary

It is evident that using only physical measures to determine functional ability is limited in predicting actual performance. In determining functional ability, the inclusion of the measurement of psychosocial factors such as self-efficacy belief is suggested in this review. However, further understanding of the association between psychosocial factors and functional performance is needed. For example, the relationship between self-efficacy belief towards lifting performance and perceived health of individuals with low back pain has not been studied. The aim of this study is to gain an understanding of the relationship

between self-efficacy beliefs and perceived health status among workers with low back pain.

CHAPTER III

THEORIZED RELATIONSHIP BETWEEN VARIABLES

The proposed study is conceptualized within the Person-Occupation-Environment occupational therapy framework by Law et al., (1996), focusing on the interaction between the Person's perceptions of their ability to perform their Occupation, in particular how their perceptions are influenced by their health status. As such, it is anticipated to provide insight into the impact of perception on performance and may have some implications on return to work programs. Studies of the relationship between self-efficacy belief and lifting (Lachner and Carosella, 1999) and isokinetic trunk movement (Estlander et al., 1994) found a positive and significant association between these variables. We hypothesize that poor health rating would lead to poor self-efficacy belief toward lifting tasks. Therefore, there will be a large discrepancy (the actual performance will be higher than the perceived ability) between ratings of self-efficacy and actual performance on lift tasks when perceived health is poor.

There are considerations made to improve on previous related studies. Firstly, all subjects would be blind to their actual performance while being tested to the most amount of weight they could lift. This should reduce the likelihood that the worker will only lift the amount of weight he has predicted.

Secondly, perceived ability will be measured using a survey that captures the entire requirement of the lift tasks. This was not evident in the Piela, Hallenberg, Geoghegan, Monsein, and Lindgren, (1996) study where for example the repetition requirement of the lift task was not captured in the questions on perceived ability. Since perceived ability involves the individual's appraisal of the demands of the task, the full disclosure of the demand should be provided to

allow for a clear understanding of the demand. Bandura (1986), in Pajares, (1996) reported that reasonably precise judgments of capability matched to a specific outcome afford the greatest prediction and offer the best explanations of performance outcomes, for these are typically the sorts of judgments that individuals use when confronted with behavioral tasks.

Finally, consideration was given to include the decision-making approach on functional ability by the facility in which this study was conducted. The functional status of an individual is based on performance on lifting tasks and is categorized based according to the amount of weight lifted. This approach is derived from the National Occupational Classification (Human Resource Development Canada, 2001). The minimum amount of weight separating the levels of functional status is 10 pounds (4.4 kg). This 10-pound difference between the functional levels is equivalent to 20 percent of the average functional level (50 pounds) of the jobs of most of the clients who receive service at this facility. The hypotheses were developed to include this difference.

CHAPTER IV

RESEARCH METHOD

A. Sampling and design

A cross-sectional study design was used. A sample of Worker's Compensation Board (WCB) – Alberta claimants who met the study inclusion criteria was conveniently enrolled. The workers were off work due to low back pain. In definition, "low back pain" means pain confined to the back or with radiation to above the knee (Spitzer, 1987). The duration of the low back pain had to be at least six weeks, suggesting that their problem was no longer acute. The workers were enrolled one to two days prior to being discharged from their rehabilitation program. A control group of non-WCB Alberta claimants with no low back pain were enrolled for comparison. The control group included a convenience sample of males and females from the Edmonton and Vegreville, Alberta regions. They included individuals from a rehabilitation centre (staff), a mechanic shop, and from a Case Processing Centre. Male and female subjects between the ages of eighteen and sixty-five years old who were employed in manual materials handling jobs were included. They had to have at a least grade eight North American level of education or equivalent.

In order to be eligible to participate in the study, the subjects had to have medical stability to participate in the functional capacity evaluation. For the group with low back pain their admission to the rehabilitation program was indicative of their medical stability, as it is a requirement of the rehabilitation facility in which the study was conducted. For the control group, medical stability was determined using the Client Health Questionnaire (Appendix O) reviewed by a registered physical or occupational therapist at the facility. Subjects who had

medical problems of the upper and lower extremities were not included in the study. All subjects were required to sign a written consent form (Appendix E).

Sample size was determined in accordance with the sample requirements of the statistical method used to analyze the variables in this study. Pearson Product Moment Correlation was used. According to Glass & Hopkins (1996) at least thirty subjects were required for each subject group.

B. Procedure

The subjects were instructed as to the testing procedure. One to two days prior to undergoing a discharge Functional Capacity Evaluation (FCE) (Appendix S) all subjects with low back pain received the Physical Ability Estimation (PAE) form (Appendix B), the SF-36 (SF-36) Health Survey questionnaire (Appendix P), the Sickness Impact Profile (SIP) (Appendix R), and the Pain Disability Index (PDI) and Pain Visual Analogue Scale (VAS) (Appendix Q) to complete. Information on descriptive characteristics including subject age, gender, diagnosis of back trouble, duration of back trouble, employment status, were obtained from the subjects and, for the those with low back pain, also from the administrative database at the WCB-Alberta rehabilitation facility.

The questionnaires were self-administered and contained standardized instructions. The subjects were asked to complete the questionnaires and were instructed to place them in a sealed envelope. The length of time to complete the questionnaires is approximately 30 minutes. The subjects were instructed to not discuss their ratings of ability with the assessing therapists. Then, the FCE (Appendix S) was conducted by a trained occupational therapist (this included the investigator) using the standard protocol of the Isernhagen kinesiophysical

FCE for determining maximum lifting level for each lift (Isernhagen, 1992). The tests were conducted in the following sequence: waist-to-floor lift, waist-to-waist lift and waist-to-crown lift. Subjects were individually tested. The length of this test is 15-20 minutes. The therapists were blind to the perceived ability of the subjects and the subjects were blind to the amount of weight lifted (it was covered). At the conclusion of the FCE, a photocopy of the data collection sheet was obtained from the assessing therapists by the investigator. In addition to undergoing the aforementioned procedure, the control subjects completed a Client Health Questionnaire (Appendix O). This questionnaire was reviewed by a physical and an occupational therapist to give clearance for participation in this study. Then the rest of the questionnaires relevant to the study were given to the control subjects for completion.

C. Measures

i. Physical Ability Estimation form (Appendix B)

Each participant completed the Physical Ability Estimation (PAE) form prior to undergoing the FCE. The PAE form was developed by the investigators to obtain the perceived lifting ability of the participants on the three lift tasks. The subjects were instructed to complete the following questions based on what they felt at that moment:

1. What is the maximum amount of weight you feel you can lift from floor to your waist level and repeat it five (5) times?___lbs
2. What is the maximum amount of weight do you feel you can lift from waist to waist level and repeat it five (5) times?___lbs
3. What is the maximum amount of weight do you feel you can lift from the waist to crown level and repeat it five (5) times?___lbs

Images of each lift accompanied the respective questions to reduce the need for detailed verbal explanation of each lift. In the study by Viikari-Juntura, et al.,

(1996), visual presentation was used to clarify different body postures. The use of pictures in the questionnaire minimized the need for detailed explanation of each posture.

The PAE form has face validity for measuring an individual's belief in ability by asking "what is the maximum amount of weight you feel you can lift...". A similar tool was employed by Piela et al., (1996), however the authors did not specifically indicate the number of repetitions the lift task required. There are two scales reported in the literature that have been developed to assess a person's self-efficacy (belief) towards work-related tasks (Spinal Function Sort (SFS), Matheson, Matheson, and Grant, 1993; and Functional Self-Efficacy Scale (FSES), Lachner et al., 1996). Gibson and Strong (1998) found support for the test-retest reliability and construct validity of the SFS in persons with chronic low back pain. The SFS asks subjects to rate their lifting ability on a scale of physical demands level. The FSE scale asks persons to identify essential job tasks, indicate whether they can perform the task and asks them to rate their level of confidence to perform the task. Construct validity has been found in individuals with low back pain however there is further need to examine its reliability and validity (Lachner et al., 1996, in Gibson and Strong, 1998).

The FSE and the SFS scales were not used in this study because they measure self-efficacy belief of functional ability that do not match the functional activity-related variable in this study. Therefore, a more specific tool, such as the PAE needed to be developed and used.

ii. SF-36 Health Survey (Appendix P)

The SF-36 version 2 is a health survey questionnaire, a generic measure of perceived health status. It assesses the impact of injury on a patient's health-

related quality of life. It's internal reliability in the general and chronic disease populations ranges from 0.78 to 0.93 (McHorney, Ware, and Raczek, 1994). Its validity versus indicators such as presence or absence of disease, severity with a disease category, and changes in disease-related symptoms over time has been documented (Ware and Gandek, 1994, in Wittink et al., 2001). It has been used with the low back pain population (Ware and Gandek, 1994, in Wittink et al., 2001; and van der Giezen, Bouter, and Nijhuis, 2000). It is found to be significantly correlated with the Oswestry Disability Questionnaire and the low back pain disability domain (Grevitt, Khazim, Webb, Mulholland, and Shepherd, 1997).

It measures seven dimensions of health status and includes an eighth item asking participants to identify any health changes during the past year. The dimensions include physical functioning, social functioning, role limitations because of physical problems, and role limitations because of emotional problems, mental health, energy/vitality, pain, and general health perception. The scores on the items range from 0-100 and higher scores indicate better health state. A score is significant only when related to a baseline score or compared to another score. For example, a positive change from a baseline score means better health (it is higher than the baseline score). The composite summary scores for the mental and physical dimensions were analyzed with the absolute difference scores to determine their association. The physical composite summary score describes physical state and the mental summary describes the psychological state of the individual.

iii. Functional Capacity Evaluation (Appendix S)

The Isernhagen Work Systems (IWS) Functional Capacity Evaluation (FCE) was used as the performance-based measure of work-related function.

The FCE was designed for the purpose of quantifying the safe functional ability of a person with work-related impairments (Isernhagen, Hart, and Matheson, 1998). The actual performance of participating subjects was determined from this assessment tool. The three lift tasks in the IWS FCE and used in this study are: lift from waist to floor, lift from waist to waist, and lift from waist to crown planes.

The IWS FCE is based on a kinesiophysical model, making use of observation of movement patterns to evaluate safe levels of function (Isernhagen, 1992). Safety is given a top priority in most FCE approaches, including the IWS, (Gibson and Strong, 1998), and refers to safe bodily mechanics such as body movement and physiological status (i.e. safe heart rate levels). Gardener & McKenna (1999) suggested that a safe lift include avoidance of extremes of motion, lifting in a slow and controlled manner, and keeping the load as close to the body as possible.

Movement patterns, recruitment of primary and accessory muscles, and the changes in heart rate are observed during kinesiophysical testing to determine effort and safe performance. The kinesiophysical guidelines used to determine maximum safe levels of performance include (Gross and Battie, 2001):

- Muscle bulging of prime movers (i.e. lower extremity musculature should be maximally recruited)
- Involuntary use of accessory muscles (i.e. upper trapezius should be recruited when biceps brachii cannot maintain load)
- Altered body mechanics including counter-balancing or increased use of momentum (normal lordotic curve should be maintained with flexion and rotation movements of the lumbar spine, rapid flexion/extension movements of lumbar spine generating momentum avoided)

- Equilibrium, base support, efficiency and smoothness of movement (subject should be in control of the weight and appear stable)
- Cardiovascular signs including heart rate and breathing patterns (exceeding 85% of maximum heart rate being considered unsafe)
- Peripheralization of radicular or referred pain

When any of the above factors transition from safe to unsafe in the therapist's judgment, the subject's maximum level has been breached. The therapist would then document the heaviest weight level lifted safely.

The lifting components of the IWS FCE have been examined for reliability and there is substantial evidence to support test-retest and inter-rater reliability for the floor to waist lift component (Innes and Straker, 1999a) and the lift and carry tasks (Gross and Battie, 2001). Gross and Battie's research on the test-retest and inter-rater reliability was conducted with therapists from the same WCB-Alberta rehabilitation facility and indicated levels of reliability which are acceptable for clinical use.

The IWS FCE includes sixteen of the twenty items considered in the Dictionary of Occupational Titles for the measurement of physical ability. The protocol for assessment is standardized and it has good face validity making it a clinically useful tool as a part of determining functional ability.

All clinicians administering the FCE were certified administrators of the assessment tool and had undergone training by the IWS representatives. All subjects in the study were blinded to the amount of weight they lifted (only one day of lifting). This was done to control for subject bias (where subjects may lift as much weight as they initially predicted in order to support their prediction).

iv. Sickness Impact Profile (Appendix R)

The Sickness Impact Profile (Gilson et al., 1975, in Slater, Doctor, Pruitt, and Atkinson, 1997) is a self-rated global measure of health-related disability (Slater et al., 1997). It is a measure of health-related changes in behaviour associated with the carrying out of one's daily activities (Post, de Bruin, de Witte, Schrijvers, 1996). It consists of 136 items and each item describes a possible sickness impact. It has acceptable reliability and validity across various illness populations (Slater et al., 1997). The test-retest reliability and internal consistency coefficients are 0.92 and 0.94, respectively (Bergner, Bobbitt, Pollard, Martin, and Gilson, 1976, in Slater et al., 1997).

v. Pain Disability Index and Visual Analogue Scale (Appendix Q)

The Pain Disability Index is a self-report measure for pain-related distress and dysfunction (Tait et al., 1987). It measures disability due to pain (Pollard, 1984). This instrument asks subjects to rate their level of disability on a scale ranging from 0 (no disability) to 10 (total disability) in seven areas of activity; family/home responsibility, recreation, social activity, occupation, sexual behavior, self-care, and life support activity. It has clinical utility and has been reported to be valid in the chronic back pain population. Tait et al., (1987), found evidence to support the construct validity of the PDI. The PDI is also used extensively in research pertaining to chronic low back problem.

The Visual Analogue Scale measures the subject's perceived level of pain on a scale ranging from 0 (no pain) and 10 (unbearable pain).

D. Statistical Analysis

Descriptive statistics of the data, including average weight predicted and actual weight lifted on each of the three lifts (floor to waist, waist to waist, and waist to crown) was obtained. An independent t-test was utilized to determine differences between the low back and control groups. The Pearson Product Moment Correlation (PPMC) was used to determine the relationship between perceived lifting ability and actual lifts performed on the three lift sub-tests. The absolute difference of the predicted ability over the actual weight lifted (predicted/actual X 100) for each type of lift was determined. For the absolute difference score, a percentage score less than 100 indicated that perceived ability was less than actual performance, and conversely, a percentage score greater than 100 meant perceived lifting ability was greater than actual weight lifted. The Pain Disability Index and the Sickness Impact Profile scores were each analyzed with scores on the SF-36 physical and mental composite summaries to determine differences between the subjects with low back pain and the control group. Finally, using the PPMC, the absolute score and the SF-36 physical composite summary score (sf36 physical) and the mental composite summary scores (sf36 mental) were analyzed to determine whether the SF-36 scores significantly influenced the variation in the absolute scores. All analyses were performed separately for the low back pain and control groups. SPSS 12.0 software was used and a 0.05 alpha level was chosen to judge significance.

E. Ethical Consideration

This research was reviewed and approved by the Health Research Ethics Board of Alberta.

CHAPTER V

HYPOTHESES

The study aimed to address the following hypotheses:

1) The mean ratings of the low back pain group's perceived maximum lifting ability would be less than the mean rating of their actual performance by at least 10 pounds (4.4 kg) on each of the three lift tests.

2) The mean percentage of the scores of the low back pain group's perceived ability over actual performance will be less than that of the control group by a margin of twenty percent (20%) or larger.

3) There will be a positive and moderate correlation (0.3-0.6) between ratings of health (SF-36 physical and mental composite scores) and the percentage scores of perceived ability over actual weight lifted on each of the three lifts.

CHAPTER VI

RESULTS

A. Characteristics of Subjects

Descriptive statistics of the subjects are reported in Tables 1, 2, and 3. The low back pain and control subjects were similar in female-to-male ratio however the low back pain group was on average older (M=38.4, SD=10.2) than the control subjects (M=32.8, SD=8.2). There were more low back pain subjects in jobs with heavy level of physical demands (low back=38%, control=10.5%) and less in light level of physical work (low back=7%, control=36.8%). The mean duration of low back pain among the low back pain group was one hundred and fifty-eight days, with a minimum of sixty-three days and a maximum of seven hundred and twenty-six days. Sixty-four percent (twenty-seven of forty-two) of the subjects with low back pain were employed whereas all subjects in the control group were employed. The subjects with low back pain were exposed to materials handling training and the associated weight amounts during their daily rehabilitation programs for up to six weeks. In addition, prior to their admission to the rehabilitation program, they underwent a previous Functional Capacity Evaluation. The control group did not have these experiences.

B. Perceived health and disability

Comparison of the relationship between SF-36 Physical and Mental Composite Summary scores (SF-36 physical, SF-36 mental), the Pain Disability Index (PDI) and Sickness Impact Profile (SIP) for both low back pain and control groups are presented in Table 4. There was a negative correlation between the

PDI (a measure of perceived disability due to pain) and the SF-36 physical. This relationship was significant ($p < 0.01$) only for the low back pain group. The correlation was moderately high ($r=-0.704$). In regards to SF-36 mental, a negative and moderate correlation (-0.489) was found and it was significant ($p < 0.01$). This relationship was only significant for the low back pain group.

The Sickness Impact Profile (SIP) correlated negatively ($p < 0.01$) with the SF-36 mental scores in both the low back pain and control groups. Its correlation with the SF-36 physical was not significant in both the low back and control groups. The SIP and SF-36 mental correlation was moderate-high ($r=-0.664$) in the low back group, and moderate ($r=-0.464$) in the control group.

C. Perceived versus actual lift

In table 1, perceived ability versus actual lift by the low back pain and control groups is presented. The average perceived lift ability of the low back pain group was less than the actual weight lifted for floor to waist lift (–4.7kg), waist to waist lift (-7.8kg), and waist to crown lift (-2.8kg). In comparison, the control group's mean perceived ability, though less than their actual weight lifted, was relatively closer to their actual weight lifted for floor to waist lift (-2.3kg) and waist to waist lift (-5.0kg), except waist to crown lift (-3.8kg). The independent samples test indicates that the difference between the means of the two groups on all three lift tasks was significant ($p < 0.05$).

The absolute difference score (predicted weight/actual weight lifted X100) of the low back pain group was less than that of the control group on floor to waist lift (low back=85%, control=95%) and waist to waist lift (low back: 75%, control=86.7%), except waist to crown lift (low back=85%, control=83%) where it was slightly higher. Thus, on floor to waist lift and on lifting from waist to waist,

the low back pain subjects underestimated their functional ability by a larger margin. However, comparison of means through independent samples t testing indicated the difference between the means on all three lift tasks was not significant ($p > 0.05$).

This absolute difference scores between the two groups is less than the 20% and less than hypothesized (floor to waist lift=10%, waist to waist lift=11.7%).

D. Relationship Between Perceived ability and Actual Performance

The association between perceived ability and actual weight lifted was analyzed using the Pearson product moment correlation and is reported in Table 5. Perceived lifting ability correlated significantly ($p < 0.01$) with actual weight lifted from floor-to-waist ($r_{low\ back}=.710$; $r_{control}=.607$), waist-to-waist lift ($r_{low\ back}=.731$; $r_{control}=.669$), and from waist-to-crown ($r_{low\ back}=.651$; $r_{control}=.623$) for the experimental and control groups. The magnitude of the correlations was slightly stronger for the low back group for all the lifts performed.

Eighty-three percent (83%) of the experimental group compared to sixty-three percent (63%) of the control group lifted at least their predicted weight on floor-to-waist level lift. On waist-to-waist level lift, approximately ninety percent (90.5%) of the low back pain group at least lifted their predicted weight, whereas approximately seventy-one percent (71.1%) of the control group did the same. And, finally, on waist-to-crown level lift, seventy-eight percent (78.6%) of the low back pain group at least lifted their predicted weight and seventy-six point three percent (76.3%) of the control group lifted their predicted weight.

In summary, the low back pain subjects were likely to lift as much as they predicted, and there was a significantly high correlation between perceived lifting ability and actual weight lifted in all three lifts for both groups.

E. The Relationship Between Absolute Difference Scores and Perceived Health

Pearson product moment correlations were used to analyze the relationship between the absolute difference scores on each lift and the scores on SF-36 physical composite and SF-36 mental scores. The results are reported in Table 6. There were no significant correlations among the absolute scores and either of the SF-36 scores.

CHAPTER VII

DISCUSSION

A. Perceived health and the relative influence of perceived ability on actual performance

The results indicated that there was acceptable variability in the differences between perceived lifting ability (self-efficacy belief) and actual performance among the subjects. Furthermore, the correlation between perceived lifting ability (self-efficacy belief) and actual performance was positive, moderately high, and significant. However, it was found that the relationship between perceived physical health and perceived ability (self-efficacy belief) towards lifting is weak and not statistically significant. Likewise, the relationship between perceived mental health and perceived ability is weak and not statistically significant. These findings suggest that the variability between perceived lifting ability and actual performance cannot be explained by perceived health status.

Since there was variability between perceived lifting ability and actual performance, it must be explained by some other unmeasured variable. This may include factors of the person, environment and/or occupation that influence the individual's belief in ability. Factors such as coping ability, motivation to return-to-work, fear of re-injury, having a job to return to, and perceived workplace support could be considered. Future research could address these factors and determine if they have significant association with perceived lifting ability. However, the lack of association we observed between the difference between perceived and actual performance and the health status measures maybe due to beta error, i.e. missing a significant association when in reality one

exists. The probability of a beta error stems from the characteristics of the subjects with low back pain. Data on their perceived ability and actual performance was collected at the time they were completing a rehabilitation program. The program addressed the issue of functioning despite health change and pain experience. It is not known whether participation in the rehabilitation program altered the perceived health status of the subjects with low back pain. Future research should determine whether the perceived health is significantly different from the healthy population before going through a rehabilitation program. It may be more appropriate to enroll the subjects prior to their admission to a rehabilitation program.

B. Characteristics of Subjects

On average the low back pain group reported lower perceived ability on all the three lifts, and their functional performances were lower than the control group. Since the ratio of gender was very similar between the groups, it is speculated that low back pain-related disability, age, employment status, or receiving compensation may be associated with the difference between the two groups. All members of the control group were employed and working. Among the experimental group who were off work and receiving compensation, only sixty-four were still employed. All control subjects were able to reach clinician-determined maximum level of lifting on all lift tasks. In comparison, only fifty-seven percent (57.1%) of the low back group reached this level on floor to waist lift, and seventy three percent (73.8%) lifted to maximum level on waist to waist lift, and on waist to crown lift (Table 3). This difference in characteristics of the two groups is likely contributing to the difference in their absolute scores.

The subjects with low back pain were undergoing rehabilitation and this involved performance of simulated activities using objects on which the weight amount was clearly marked. It was found that the subjects with low back pain were more likely to lift at least as much weight as they predicted. The experience in undergoing an FCE prior to admission to a rehabilitation program, and the experience of manual handling in the program may explain this finding.

C. Perceived ability and actual performance

The correlations between perceived maximum lift ability and actual performance were statistically significant in all three lift tasks for the low back pain and control groups. In addition, the difference of means between the two groups was significant. As predicted, the average perceived maximum lifting ability of the low back pain group was less than the actual performance by 10 pounds (4.4 kg) on floor-to-waist and waist-to-waist lift only. This prediction was not realized on waist-to-crown lift (2.6 kg). Furthermore, the mean absolute difference scores of the subjects with low back pain was less than that of the control group but not by the twenty percent (20%) or more we predicted. In addition, this difference was not statistically significant between the two groups.

Piela et al., (1996) studied the ability of subjects with chronic low back pain to predict their physical performance on a standardized lift test. The authors reported that the subjects were not able to predict within twenty percent (20%) of their actual performance. Also, the subjects overestimated on the lift tasks, indicating that they were likely unable to lift as much as they predicted. In contrast, findings from this study indicated that subjects in the low back pain and control groups underestimated their ability, and those in the low back pain group were more likely to do so. On floor-to-waist lifting, the low back pain group

underestimated by 15% and the control by 5%, and on waist-to-waist lift the low back pain group underestimated by 25% and the control group by 13.3%. It was noted in the design of the Piela et al. study, (1996) that the questions used to determine perceived lift ability of the subjects were not specific to the actual tasks performed (i.e. the questions did not indicate how many times the lift was to be repeated). In contrast, this study made the questions specific to the actual test performed. This difference in approach to measuring perceived ability may have contributed to the difference in the outcomes of the two relatively similar studies.

In this study, the subjects with low back pain appeared more likely than the control group to lift at least as much as they predicted in all three lift tests. However, caution should be exercised in this interpretation. This is because the subjects with low back pain were more likely to underestimate their ability, therefore, are more likely to lift as much as they predicted. Nevertheless, predicted ability was positively associated with actual performance and the association is significant ($p<0.05$). This is comparable to studies that have shown a significant association between self-efficacy beliefs on lifting tasks in subjects with low back pain (Lachner and Carosella, 1999; and Estlander et al., 1994).

Although the findings on the relationship between perceived ability and actual lift performance was significant, caution should be exercised when interpreting this relationship. The PAE form used to determine ratings of perceived ability has good face validity. However, it is a newly developed tool and requires further examination of its reliability and validity.

D. Limitations

The low back pain and control subjects were conveniently recruited therefore their representation of the general population is questionable and limits the generalizability of the study. Secondly, the rehabilitation experience of the subjects with low back pain which included performing functional activities may have positively impacted their association of perceived health to their perceived ability. Ideally, future studies in this area should enroll subjects prior to any experience with a rehabilitation program. At this point of enrollment, there may be a significant difference in perceived health between the subjects with low back pain and the control (healthy) subjects. Finally, the PAE tool utilized to determine self-efficacy belief towards lifting should be tested for its intra-rater reliability.

CHAPTER VIII

CONCLUSION

This study investigated the association between perceived health and perceived ability (self-efficacy belief) to perform lift tasks in low back pain subjects. The results indicated a week association between perceived health change and perceived ability on floor-to-waist, waist-to-waist and waist-to-crown lift in subjects with low back pain. However, due to the limitations identified in the study, interpretation of this finding is limited due to the characteristics of the population studied. It is believed that the outcome may be attributed to the subjects having completed a rehabilitation program to address the issue of functioning with health changes.

Furthermore, it was found that the association between perceived ability and actual performance was positive, moderately-high, and statistically significant in both the low back pain and the control groups. This was true of the low back pain and control groups. This finding is in support of relatively similar studies found in the literature. Lachner and Carosella found in their (1999) study that functional self-efficacy was a strong determinant of performance on a lift task by subjects with low back trouble. Estlander et al., in 1994 reported that self-efficacy was a significant determinant of performance on isokinetic trunk extension and flexion tasks in patients with low back pain.

The notion that psychosocial factors influence functional performance is supported by the findings in this study. The positive and statistically significant association between perceived ability and actual performance indicates that this personal factor of the individual should be considered and assessed during functional performance. Furthermore, it was found that, in floor-to-waist and waist-to-waist lift, the mean perceived lifting ability was one physical demand

level below the mean actual performance of the subjects with low back pain. Both subjects with low back pain and control subjects underestimated their ability.

Occupational Therapy's approach to functional assessments comprise a comprehensive look at all aspects of the individual within a given environment. This includes the psychosocial factors of the person. The knowledge that there is a positive and statistically significant association between perceived lift ability and actual performance is important. However, further investigation is required to understand the factors that positively and strongly associate with perceived ability. This knowledge, in conjunction with our understanding of the association between other psychosocial factors may guide our assessment of the individual with during and after rehabilitation.

A study of this nature, on perceived health state and perceived ability towards specific lift tasks, has not been found in the scientific literature. However, it is reported that experience of injury and associated pain is often linked to perceived disability (Tait et al., 1987). This refers to general functional activities. Thus, perceived health may have a broader influence on the overall functioning of the individual than on specific functional activities such as lifting. There are other psychosocial factors that could be considered to determine their association with perceived lift ability. They include motivation, attitude, and expected outcome. These factors should be studied in future research.

The results from this study suggests that occupational therapists should take the opportunity to assess their client's belief in ability, promote the client's awareness of its impact on functional performance, and implement strategies to sustain and enhance the client's level of belief. This approach would embody client-centeredness practice, and create a mutual and more comprehensive

determination of functional ability collaboratively between the individual and the occupational therapist.

Table 1

Comparison of the study groups on performance on the FCE measures

Variable	Mean	Standard Deviation	Range	t	df	Sig. (2-tailed)
Age (years)				-2.56	77	.012
• Low back (n=42)	38.4	10.2	20-62			
• Control (n=38)	32.8	8.2	22-54			
Predicted floor level lift (kg)				5.13	78	0.00
• Low back (n=42)	16.4	8.7	0-44			
• Control (n=38)	29.8	14.7	4-67			
Actual floor level lift (kg)				4.52	78	0.00
• Low back (n=42)	20.9	10.2	6-45			
• Control (n=38)	31.6	11.4	13-51			
Absolute difference – floor lift (%)^^				1.21	78	0.231
• Low back (n=42)	83	42.7	0-200			
• Control (n=38)	95	46.5	27-286			
Predicted waist level lift (kg)				4.10	78	0.00
• Low back (n=42)	19.6	8.3	4-44			
• Control (n=38)	31.5	16.6	7-67			
Actual waist level lift (kg)				3.53	78	0.001
• Low back (n=42)	27.3	10.8	8-50			
• Control (n=38)	36	11.1	6-54			
Absolute difference – waist lift (%)				1.51	78	0.135
• Low back (n=42)	75	30.1	31-200			
• Control (n=38)	86.7	32.9	32-167			
Predicted crown level lift (kg)				2.87	78	0.005
• Low back (n=42)	13.8	7.8	0-33			
• Control (n=38)	19.1	8.9	2-44			
Actual crown level lift (kg)				4.55	78	0.000
• Low back (n=42)	16.4	7	0-31			
• Control (n=38)	23.1	6	12-36			
Absolute difference – crown lift (%)				-0.194	78	0.846
• Low back (n=42)	85	43	0-200			
• Control (n=38)	83	31	20-186			

^^absolute difference of the predicted ability over the actual weight lifted (predicted/actualX100%)

$p < 0.05$ and is significant

Table 2

Comparison of the study groups on performance on the self-report measures

Variable	Mean	SD	Range	t	df	Sig. (2-tailed)
SF-36 (sf36pcs)*				12.65	78	0.000
• Low back (n=42)	39	8.2	16-57			
• Control (n=38)	57	3.4	48-64			
SF-36 (sf36mcs)*				5.49	78	0.000
• Low back (n=42)	43	11.2	16-61			
• Control (n=38)	55	7.1	30-62			
SIP**				-8.22	78	0.000
• Low back (n=42)	14.7	10.4	0-44			
• Control (n=38)	1	1.6	0-7			
Pain Disability Index^				-10.89	78	0.000
• Low Back (n=42)	28.5	15.7	0-66			
• Control (n=38)	1	1.3	0-5			
Visual Analogue Scale#				-10.96	78	0.000
• Low back (n=42)	4.2	2.3	0-10			
• Control (n=38)	0	0.2	0-1			

*higher scores indicate perceived health state is better (range of 0-100)
**higher score means more perceived impact of sickness on functional performance (range of 0-100%)
^Higher scores means high perceived disability due to pain (range of 0-70)
#Higher value indicated higher level of pain experience (range of 0-10)
$p < 0.05$ and is significant

Table 3

Subject characteristics

Variable	Low back Pain N=42	Control N=38
Gender (%) • Male • Female	 69 31	 68 32
Physical Level of work (%) • Light (<10kg) • Medium (<22kg) • Heavy (<44kg)	 7 52 38	 36.8 52.6 10.5
Met predicted weight for floor lift (%)	83	63
Met predicted weight for waist lift (%)	90.5	71.1
Met predicted weight for crown lift (%)	78.6	76.3
Clinician-determined maximum effort Level (%)	Low Lift: 57.1 Waist Lift: 73.8 Crown Lift: 73.8	Low Lift: 100 Waist Lift: 100 Crown Lift: 100

Table 4

The correlation between the composite summary scores of the Short Form 36 health survey and the PDI and SIP scores

	Short 36 Physical Composite scores	Short 36 Mental Composite scores
PDI • Low back pain (n=42) • Control (n=38)	**-.704*** -.119	**-.489*** -.284
SIP • Low back pain (n=42) • Control (n=38)	-.295 .269	**-.664*** **-.464***

*Signifies significant correlation of $p < 0.01$.

Table 5

Pearson correlation of perceived ability versus actual lift performance of the low back pain and control subjects

	Low back pain N=42	Control N=38
Floor-to-waist lift	0.710*	0.607*
Waist-to-waist lift	0.731*	0.669*
Waist-to-crown lift	0.651*	0.623*

*Indicates significance of $p < 0.01$

Table 6

Pearson Correlation of the independent variables and the absolute lift difference

Variable	Absolute - Low lift	Absolute – Waist lift	Absolute – Crown Lift
SF-36 pcs			
• Low back (n=42)	-.178	-.120	-.066
• Control (n=38)	-.031	.136	-.129
SF-36 mcs			
• Low back (n=42)	.167	.165	.161
• Control (n=38)	-.277	.185	.294

APPENDIX A
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APPENDIX B
PHYSICAL ABILITY ESTIMATION FORM

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

Question	Image
What is the maximum amount of weight you feel you can lift from the floor to your waist and repeat it five times?___lbs	
What is the maximum amount of weight you feel you can lift at your waist level moving it from side to side and repeat it five times?___lbs	
What is the maximum amount of weight you feel you can lift from your waist level to height of your head and repeat it five times?___lbs	

APPENDIX C
SUBJECT INFORMATION SHEET (STUDY GROUP)

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

Background:

Often, a return to work decision is based on comparing a person's ability to lift and carry to what they have to lift or carry at their job. It has been shown that workers cannot predict their actual physical ability accurately enough for safe return to work: therefore, a therapist administers a test with the worker. The test is called a Functional Capacity Evaluation (FCE).

As part of your program at the WCB you are to participate in a Functional Capacity Evaluation (FCE) to find out how much work you can do safely. The test is conducted over one day or over two consecutive days depending on what your therapist or doctor recommend (1-2 hours the first day and up to 2 hours the second day). If you are being tested over two days the same therapist will perform the test. The test includes:

- how much weight you can lift, carry, push and pull
- how strong your muscles are in your hands, arms, shoulders, back, and legs

A medical doctor examined you before you entered your program to be sure that you will not be harmed by participating in your program or the FCE. Qualified and experienced clinicians will carry out the FCE with you in a safe manner. The therapist will give you specific instructions and will watch as you perform lifting and the other activities. You will wear a heart rate monitor to make sure that you do not go past the safe heart rate limit set by the therapist.

The FCE will measure the maximum amount of weight you can lift from waist to floor, side to side, and to your head height, by starting with low weights and gradually increasing the weight. During the lifting evaluation, **you will not be told** how much weight you are lifting, but the therapist will stop you at the weight level that is your safe maximum.

About this study:

For this study, before participating in the FCE described above you will be asked to fill out two questionnaires and one form. This should take about 1 hour in addition to the time for your FCE. You will be given $10 for completing the questionnaires and form, even if you withdraw from the study or stop participating. The questionnaires and form we are asking you to complete for this study are:

- a health questionnaire called Short Form-36 version 2 (SF36 v2)
- a form asking you the maximum amount of weight you feel you can lift (from waist to floor, side to side, and to your head height) if you had to repeat the lift 5 times
- a questionnaire called the Sickness Impact Profile.

Studies have been done to understand the factors that affect a person's likelihood of returning to work after a work injury. Some studies have shown that how a person feels about their health and physical ability is as important in explaining the individual's return-to-work as the injury itself.

The purpose of this study is to explore the relationship between the way people feel about their health, the way they feel about their physical ability, and their actual lifting ability as measured during the FCE. This knowledge may help therapists improve safe and timely return-to-work for injured workers.

Sometimes, the results of the FCE show that there is a gap between what a person feels about their physical ability and their actual physical ability. Because we want to make an unbiased comparison, **we do not want you to see how much you lift during the FCE** and **we ask that you not discuss your own estimate of your physical ability with the assessing therapist.**

All the information collected from you in this study will be given a code number and kept confidential, and will only be viewed by the researcher. Your name will not be used in a paper or presentation. All the data collection forms will be stored in a locked file cabinet at the Occupational Therapy Resource Library at Corbett Hall, University of Alberta. The results will be stored for at least five (5) years as required by the University of Alberta Research Policies and Services Manual, sections 5.2 and 7.

Your completion of the two questionnaires and one form for this study is voluntary. You may withdraw from the study at any time for any reason.

Your case manager will know that you are participating in this study; however, he/she will not know your results. If you decide to withdraw from completing the two questionnaires and one form for this study, it will not affect the treatment you receive at Millard Health, or how your Worker's Compensation Board (WCB) claim is managed. (However, the results of your FCE will be used to make recommendations regarding treatment and/or your ability to work).

The information gathered for this study may be looked at again in the future to help answer other study questions. If so, the ethics board will first review the study to ensure the information is used ethically.

This study is being conducted for a thesis in partial fulfillment of degree requirements for a Master of Science degree being completed by the co-investigator. If you have any concerns regarding this research study, you may contact, Professor E. Sharon Brintnell, Department of Occupational Therapy, University of Alberta, by phoning 492-2067.

Signature of subject _____

_____

Signature of Principal Investigator

Thank you for agreeing to participate in this research study.

APPENDIX D
SUBJECT INFORMATION SHEET (CONTROL GROUP)

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

Background:

For workers who have experienced an injury and are off work, often, a return to work decision is based on comparing the workers' ability to lift and carry to what they have to lift or carry at their job. It has been shown that workers with a back injury cannot predict their actual physical ability accurately enough for safe return to work; therefore a therapist administers a test with the worker. The test is called a Functional Capacity Evaluation (FCE).

The Functional Capacity Evaluation is conducted over at least one day by a therapist. The test includes:

- how much weight you can lift
- how strong your muscles are in your hands, arms, shoulders, back, and legs

The aim of this study is to find out whether factors related to a worker's perceived health affect his prediction of his ability. You are being asked to join the study so we can compare those workers who have low back pain with individuals like you who do not have low back pain or problem at this time.

You will be asked to complete a Health Questionnaire (Physical Activities Readiness Questionnaire – Par-Q), and review it with a trained therapist to make sure that you will not be harmed by participating in a Functional Capacity Evaluation. If it is safe for you to be a part of the study, an experienced clinician will carry out the FCE with you in a safe manner. The therapist will give you specific instructions and will watch as you perform three lifting activities (lift from floor to waist, waist to waist, and to crown work planes). You will wear a heart rate monitor to make sure that you do not go past the safe heart rate limit set by the therapist.

The FCE will measure the maximum amount of weight you can lift from waist to floor, side to side, and to your head height, by starting with low weights and gradually increasing the weight. During the lifting evaluation, **you will not be told** how much weight you are lifting; but the therapist will stop you at the weight level that is your safe maximum.

About this study:

For this study, before participating in the FCE described above you will be asked to fill out three questionnaires and one form. Overall, this study will take up to 2 hours of your time

and take place in one day. You will be given $10 for completing the questionnaires and form, even if you withdraw from the study or stop participating. The questionnaires and form we are asking you to complete for this study are:

- a health questionnaire called Short Form-36 version 2 (SF36 v2)
- a health questionnaire (Par-Q) to obtain your medical history to make sure that it is safe to perform the activities of this study
- a form asking you the maximum amount of weight you feel you can lift (from waist to floor, side to side, and to your head height) if you had to repeat the lift 5 times
- a questionnaire called the Sickness Impact Profile.

Studies have been done to understand the factors that affect a person's likelihood of returning to work after a work injury. Some studies have shown that how a person feels about their health and physical ability is as important in explaining the individual's return-to-work as the injury itself.

The purpose of this study is to explore the relationship between the way people feel about their health, the way they feel about their physical ability, and their actual lifting ability as measured during the FCE. This knowledge may help therapists improve safe and timely return-to-work for injured workers.

Sometimes, the results of the FCE show that there is a gap between what a person feels about their physical ability and their actual physical ability. Because we want to make an unbiased comparison, **we do not want you to see how much you lift during the FCE** and **we ask that you not discuss your own estimate of your physical ability with the assessing therapist.**

All the information collected from you in this study will be given a code number and kept confidential, and will only be viewed by the researcher. Your name will not be used in a paper or presentation. All the data collection forms will be stored in a locked file cabinet at the Occupational Therapy Resource Library at Corbett Hall, University of Alberta. The results will be stored for at least five (5) years as required by the University of Alberta Research Policies and Services Manual, sections 5.2 and 7.

Your completion of the three questionnaires and one form for this study is voluntary. You may withdraw from the study at any time for any reason.

The information gathered for this study may be looked at again in the future to help answer other study questions. If so, the ethics board will first review the study to ensure the information is used ethically.

This study is being conducted for a thesis in partial fulfillment of degree requirements for a Master of Science degree being completed by the co-investigator. If you have any concerns regarding this research study, you may contact, Professor E. Sharon Brintnell, Department of Occupational Therapy, University of Alberta, by phoning 492-2067.

_____

Signature of subject

_____

Signature of Principal Investigator

Thank you for agreeing to participate in this research study.

APPENDIX E
SUBJECT CONSENT FORM

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

To be completed by the research subject:

Do you understand that you have been asked to be in a research study?	Yes No
Have you read and received a copy of the attached information sheet?	Yes No
Do you understand the benefits and risk involved in taking part in this evaluation?	Yes No
Have you had an opportunity to ask questions and discuss the evaluation?	Yes No
Do you understand that you are free to refuse to participate or withdraw from the evaluation at any time? You do not have to give a reason and it will not affect your employment status, or WCB claim, if you are on WCB.	Yes No
Has the issue of confidentiality been explained to you?	Yes No
Do you understand who will have access to your records/information?	Yes No

This evaluation study was explained to me by: _____

I agree to take part in this evaluation study.

_____

Signature of Research Participant Date

_____

Printed Name

_____

Signature of Witness Date

_____

Printed Name

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____

Signature of investigator

_____

Date

APPENDIX F
STUDY SUBJECT DATA SHEET

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

TO BE COMPLETED BY SUBJECT: DATE:_____

1) Name....._____
2) Age....._____
3) Gender (please circle).....M F
4) Diagnosis as stated in WCB entitlement....._____
5) Occupation when injured....._____
6) Date of injury....._____
7) Last date worked....._____
8) Do you presently have a job to return to ..._____
9) Number of times you have received WCB benefits because of low back pain....._____
10) Have you been diagnosed with depression or a psychiatric problem? Yes No

APPENDIX G
CONTROL GROUP SUBJECT DATA SHEET

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

TO BE COMPLETED BY SUBJECT: DATE:_____

1) Name....._____
2) Age....._____
3) Gender (please circle).....M F
4) Last date worked....._____
5) Are you presently employed (please circle)...___Yes_____No_____
6) Number of times you have received WCB benefits because of low back pain....._____
7) Have you been diagnosed with depression or a psychiatric problem? Yes No

APPENDIX H
FITNESS FOR FCE FORM (CONTROL GROUP)

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

Subject Name: _____

In review of the Health Questionnaire the subject is cleared to participate in the Functional Capacity Evaluation. There are no concerns that require medical review.

Please circle Y if you agree or N if you disagree with the above statement.

Y N

Therapist Signature_____

Therapist Name (Print)_____

APPENDIX I
THERAPIST INFORMATION SHEET

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

You have been asked to participate in this study to analyze the relationship between perceived maximum lifting ability, actual performance, and self-rated health status of individuals with chronic low back pain. Analysis of the results of the study will potentially add to the knowledge on disability management and help us develop strategies to manage work disability resulting from back trouble.

You may already know that the study subjects involved in this study are Workers Compensation Board – Alberta Claimants who have been admitted to your rehabilitation program for treatment. Also, at the point of discharge from your program, unless there is an exception, you are to conduct a functional assessment to determine the functional ability of the workers on their discharge assessment. For this study, the investigators will collect information on the performance of the study participants on the three lift sub-tests. The lifting protocols from the Isernhagen Work System's Functional Capacity Evaluation Manual will be followed.

The subject will be blinded to the amount of weight you ask them to lift (the weight will be covered). You will perform a one or 2-day Functional Capacity Evaluation, whichever you have decided for your client (subject). However, the investigators will obtain information from the following lifts:

- Waist to floor level lift
- Waist to waist (horizontal) lift
- Waist to crown (overhead) lift

The protocol for each lift will be followed as outlined in the Isernhagen Work Systems' FCE Manual. Testing will begin with a low weight. You will demonstrate each lift to the subject using safe body mechanics. The first lift can be used to allow the subject to familiarize himself to the test. This is a time to educate the subject to safely perform the lift. You will ask the subject to repeat each set of a lift five times. The subject will wear a heart rate monitor programmed to sound an alarm when the maximum safe heart rate level is reached. The safe maximum heart rate is 85% of the subject's age-adjusted maximal heart rate. At the end of each set of a lift, you will ask the subject to report their current heart rate. You will document the amount of weight lifted, the heart rate, and the amount of time it took to complete the set of lift. After each set, you will increase the amount of weight the subject is to lift until the subject has reached what is in your judgment their safe maximum level for the lift performed. You will record the safe maximum weight on each lift performance. The data collection form will be filled out in pen.

If a performance on a lift takes more than 90 seconds it will be deemed non-functional and the performance prior to that level will be considered maximal for that subject according to protocol. If a subject desires to stop testing due to pain or feeling unsafe the highest weight completed will be considered as the maximal level and testing for that lift will be stopped. You will record limiting factors leading to test termination on the documentation form at the

end of each respective lift. The limiting factors will be categorized as related to physical maximums, cardiovascular limitations, pain, time, or subject's desire.

Immediately at completion of the assessment, the principal investigator will meet with you and make a second copy of the data collection sheet and store them in a secure area. Therapists participating in this study will be asked to not discuss the subject's performance with the other therapist's involved in this study.

Your participation in this study is voluntary. It should not add additional time to your workday at Millard Health.

All information obtained during this study will be kept confidential and will only be seen by the study investigators. You will be asked to provide personal information including professional title, gender, number of years in professional practice, how many years you have been administering kinesiophysical FCEs, how many times per week you perform evaluations using kinesiophysical method, and with approximation, how many FCEs you have performed since being trained.

All the data collection forms will be stored in a locked file cabinet at the Occupational Therapy Resource Library at Corbett Hall, University of Alberta. They will be stored for seven years. You will not be personally named in any paper or presentation. You have the freedom to withdraw from the study at anytime.

This study is in fulfillment of degree requirements for the principal investigator and forms his Master's thesis. If you have any concerns regarding this research study, you may contact, Professor E. Sharon Brintnell, Department of Occupational Therapy, University of Alberta, by phoning 492-2067. Thank you for assisting with this research study.

Signature of Therapist_____

Signature of Principal Investigator_____

APPENDIX J
THERAPIST CONSENT FORM

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

To be completed by the research subject:

Do you understand that you have been asked to be in a research study? Yes No

Have you read and received a copy of the attached information sheet? Yes No

Do you understand the benefits and risk involved in taking part in this evaluation? Yes No

Have you had an opportunity to ask questions and discuss the evaluation? Yes No

Do you understand that you are free to refuse to participate or withdraw from the evaluation at any time? Yes No

Has the issue of confidentiality been explained to you? Yes No

Do you understand who will have access to your records/information? Yes No

This evaluation study was explained to me by: _____

I agree to take part in this evaluation study.

_____

Signature of Research Participant Date

_____

Printed Name

_____

Signature of Witness Date

_____

Printed Name

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____

Signature of investigator

_____

Date

The information sheet must be attached to this consent form and a copy given to the research subject.

APPENDIX K
THERAPIST DATA SHEET

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

A) What is your gender? (please circle) Male Female

B) How long have you been in professional practice as an occupational therapist (in years)?_____

C) Do you work full-time, part-time, or casually?_____

D) Have you been trained in administering kinesiophysical Functional Capacity Evaluation by representatives from Isernhagen Work Systems? (please circle Y is yes, N is No).

Y N

E) How many years have you been administering Functional Capacity Evaluations using the kinesiophysical method (including full or partial evaluations)?

_____

F) How many times per week do you perform evaluations using the kinesiophysical method?

_____

How many evaluations have you performed since being trained in the kinesiopysical method (best estimate)?

APPENDIX L
RECRUITMENT ADVERTISEMENT FORM

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

We are conducting a research study to understand the relationship between what a person feels they can lift compared to what they actually lift on a standardized test.

The intention of this study is to understand the influence of the differences and similarities between estimated ability and actual performance on day-to-day functioning in the workplace.

If you are:

- Between the ages of 18 and 65
- Not experiencing back pain

You may be eligible to participate in this study.

If you are interested, please contact Alexander at 498-3315 to find out more about this study.

APPENDIX M
RESEARCH FACILITY

Title of Project: THE RELATIONSHIP BETWEEN PERCEIVED MAXIMUM LIFTING ABILITY, ACTUAL PERFORMANCE AND SELF-RATED HEALTH STATUS

Principal Investigator - E Sharon Brintnell
Co-investigator – Alexander Appah
Affiliations and phone numbers – Faculty of Rehabilitation Medicine, University of Alberta. Millard Health (Alexander). Alexander's phone 498-3315, Professor Brintnell's phone 492-2067.

The Millard Health Centre, a WCB-Alberta facility, is an accredited rehabilitation facility offering Comprehensive Occupational Rehabilitation Programs to insured injured workers. The Millard Health Interdisciplinary Rehabilitation (IR) program specializes in designing rehabilitation programs to treat injured workers and help them return to work. Almost 45% of the client population have back trouble. This Rehabilitation Centre sees over three thousand clients each year.

Occupational therapists (nine) at the Millard Health Work Assessment Centre were asked to perform the functional assessment of study and control group participants. The inter-rater reliability of the therapists on the three lift tasks (floor to waist, waist to waist, and waist to crown level lifting) was determined.

APPENDIX N
HEALTH RESEARCH ETHICS APPROVAL

Health Research Ethics Board

2J2.27 Walter Mackenzie Centre
University of Alberta, Edmonton, Alberta T6G 2R7
p.780.492.0724
p.780.492.0459
f.780.492.7303
ethics@med.ualberta.ca

April 9, 2003

Alexander Appah & E. Sharon Brintnell
Occupational Performance Analysis Unit/ Faculty of Rehabilitation Medicine
c/o 1147 Rutherford Close
Edmonton, AB
T6W 1H5

Re: The relationship between perceived maximum lifting ability, actual performance and self-rated health status

Dear Mr. Appah & Ms. Brintnell,

Please find enclosed your letter of ethical approval for the above study. Please quote file number **B-200303-REM** in any future correspondence with the ethics board. On behalf of the Health Research Ethics Board (B: Health Research), I wish you every success in your research endeavours.

Sincerely,

Gillian Johnson

Gillian Johnson
Administrative Assistant
Health Research Ethics Board (B: Health Research)
(780) 492-0839

encl.

APPENDIX O
CLIENT HEALTH QUESTIONNAIRE (PAR-Q)

ASSESSMENT SERVICES
CLIENT HEALTH QUESTIONNAIRE

Millard Health

MEDICAL HISTORY

Physical Activity Readiness

YES	NO		COMMENTS (MILLARD HEALTH STAFF ONLY)
☐	☐	Has your doctor ever said that you have a heart condition and recommended only medically-approved physical activity?	
☐	☐	Do you have chest pain brought on by physical activity?	
☐	☐	Have you developed chest pain at rest in the past month?	
☐	☐	Do you lose consciousness or lose your balance as a result of dizziness?	
☐	☐	Do you have a bone or joint problem (other than your injury) that could be aggravated by a physical activity?	
☐	☐	Is your doctor currently prescribing you medication for a blood pressure or heart condition?	
☐	☐	Are you aware, through your own experience or a doctor's advice, of any other reason against your exercising without medical approval?	
☐	☐	If you are female, are your pregnant?	
☐	☐	Do you experience difficulty breathing at rest?	
☐	☐	Do you have a history of asthma or emphysema?	
☐	☐	Do you have a persistent cough?	
☐	☐	Have you had a viral infection recently (e.g., cold, flu, etc.)?	
☐	☐	Have you had problems with swelling of the knees, ankles or feet?	

Personal Health

YES	NO		COMMENTS (MILLARD HEALTH STAFF ONLY)
☐	☐	Any health problems at the present time other than your injury?	
☐	☐	Have you had any serious health problems in the past?	
☐	☐	Are you taking any medication?	
☐	☐	Do you have any allergies to any medications?	
☐	☐	Do you smoke?	
☐	☐	Is there any history of heart problems in your immediate family (father/mother/brothers/sisters)?	

The above "YES" responses were reviewed by the assessing Exercise Therapist. Name _____ Date _____

APPENDIX P
SF-36 VERSION 2 – HEALTH SURVEY
PAIN DISABILITY INDEX

Millard Health

Service Line _____ **Program** _____

Name	Millard file no.	Date
Program	Team/assessment type	☐ Admission ☐ Discharge

The rating scales below measure the impact of chronic pain in your everyday life. We want to know how much your pain is preventing you from doing your normal activities. For each of the seven categories of life activity listed, circle the one number that best reflects the level of disability you typically experience. A score of "0" means no disability at all. A score of "10" means that all the activities you would normally do have been disrupted or prevented by your pain.

Your rating should reflect the overall impact of pain in your life, not just when the pain is at its worst. Make a rating for every category. If you think a category does not apply to you, circle "0".

Family/home responsibilities. This category refers to activities related to the home or family. It includes chores and duties performed around the house (e.g., yard work) and errands or favours for other family members (e.g. driving the children to school).

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Recreation. This category includes hobbies, sports and other similar leisure time activities.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Social activity. This category refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, theatre, concerts, dining out and other social functions.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Occupation. This category refers to activities that are a part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer worker.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Sexual behaviour. This category refers to the frequency and quality of one's sex life.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Self-care. This category includes activities that involve personal maintenance and independent daily living (e.g., taking a shower, driving, getting dressed, etc.).

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Life-support activity. This category refers to basic life supporting behaviours such as eating, sleeping and breathing.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

VISUAL ANALOGUE SCALE

On a scale of 0-10 (where 0 is no pain and 10 is unbearable pain, the worst pain you can imagine), mark where your pain is most of the time.

0 — 10
no pain — unbearable pain

© Millard Health – Pain Disability Index

131 Airport Road, Edmonton, AB, T5G 0W6, Phone: (780) 498-3200, Toll Free: (888) 498-9902, Fax: (780) 498-3907

APPENDIX P
SF-36 VERSION 2 – HEALTH SURVEY

SF36 Version 2 - HEALTH SURVEY

Millard Health

Service Line _____ **Program** _____

☐ Admission ☐ Discharge

Client name _____

Millard file no. _____ Date _____

Instructions:

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. Answer each question by selecting the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can.

1. In general, would you say your health is:

   ☐ 1 – excellent ☐ 2 – very good ☐ 3 – good ☐ 4 – fair ☐ 5 – poor

2. *Compared to one year ago*, how would you rate your health in general *now?*

   ☐ 1 – much better now than one year ago
   ☐ 2 – somewhat better now than one year ago
   ☐ 3 – about the same now as one year ago
   ☐ 4 – somewhat worse now than one year ago
   ☐ 5 – much worse now than one year ago

3. The following items are about activities you might do during a typical day. Does *your health* now limit you in these activities? If so, how much?

Activities	Yes, limited a lot.	Yes, limited a little.	No, not limited at all.
a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.	1	2	3
b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf.	1	2	3
c. Lifting or carrying groceries.	1	2	3
d. Climbing several flights of stairs.	1	2	3
e. Climbing one flight of stairs.	1	2	3
f. Bending, kneeling or stooping.	1	2	3
g. Walking more than a mile.	1	2	3
h. Walking several hundred yards.	1	2	3
i. Walking one hundred yards.	1	2	3
j. Bathing or dressing yourself.	1	2	3

4. During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities *as a result of your physical health?*

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Cut down on the amount of time you spent on work or other activities.	1	2	3	4	5
b. Accomplished less than you would like.	1	2	3	4	5
c. Were limited in the kind of work or other activities.	1	2	3	4	5
d. Had difficulty performing the work or other activities (for example, it took extra effort).	1	2	3	4	5

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5. During the *past 4 weeks*, have you had any of the following problems with your work or other regular activities *as a result of any emotional problems* (such as feeling depressed and anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a. Cut down on the amount of time you spent on work or other activities.	1	2	3	4	5
b. Accomplished less than you would like.	1	2	3	4	5
c. Did work or other activities less carefully than usual.	1	2	3	4	5

6. During the *past 4 weeks*, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors or groups?

☐ 1 – not at all ☐ 2 – slightly ☐ 3 – moderately ☐ 4 – quite a bit ☐ 5 – extremely

7. How much *bodily* pain have you had during the *past 4 weeks*?

☐ 1 – none ☐ 2 – very mild ☐ 3 – mild ☐ 4 – moderate ☐ 5 – severe ☐ 6 – very severe

8. During the *past 4 weeks*, how much did *pain* interfere with your normal work (including both work outside the home and housework)?

☐ 1 – not at all ☐ 2 – a little bit ☐ 3 – moderately ☐ 4 – quite a bit ☐ 5 – extremely

9. These questions are about how you feel and how things have been with you *during the past 4 weeks*. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the *past 4 weeks*:

	All of the time	Most of the time	Some of the time	A little of the time	None of The time
a. Did you feel full of life?	1	2	3	4	5
b. Have you been very nervous?	1	2	3	4	5
c. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5
d. Have you felt calm and peaceful?	1	2	3	4	5
e. Did you have a lot of energy?	1	2	3	4	5
f. Have you felt downhearted and depressed?	1	2	3	4	5
g. Did you feel worn out?	1	2	3	4	5
h. Have you been happy?	1	2	3	4	5
i. Did you feel tired?	1	2	3	4	5

10. During the *past 4 weeks*, how much of the time has your *physical health or emotional problems* interfered with your social activities (like visiting friends, relatives, etc.)?

☐ 1 – all of the time ☐ 2 – most of the time ☐ 3 – some of the time ☐ 4 – a little of the time ☐ 5 – none of the time

11. How TRUE or FALSE is *each* of the following statements for you?

	Definitely true	Mostly true	Do not know	Mostly false	Definitely false
a. I seem to get sick a little easier than other people.	1	2	3	4	5
b. I am as healthy as anybody I know.	1	2	3	4	5
c. I expect my health to get worse.	1	2	3	4	5
d. My health is excellent.	1	2	3	4	5

From Ware JE Jr, Snow KK, Kosinski M, Gandek B, SF-36 Health Survey: manual and interpretation guide. Boston, MA: The Health Institute, New England Medical Centre, 1993:B1-B5. With permission.

Client signature _____

APPENDIX Q
PAIN DISABILITY INDEX AND VISUAL ANALOGUE SCALE

PAIN DISABILITY INDEX

Millard Health

Service Line _____ **Program** _____

Name	Millard file no.	Date
Program	Team/assessment type	☐ Admission ☐ Discharge

The rating scales below measure the impact of chronic pain in your everyday life. We want to know how much your pain is preventing you from doing your normal activities. For each of the seven categories of life activity listed, circle the one number that best reflects the level of disability you typically experience. A score of "0" means no disability at all. A score of "10" means that all the activities you would normally do have been disrupted or prevented by your pain.

Your rating should reflect the overall impact of pain in your life, not just when the pain is at its worst. Make a rating for every category. If you think a category does not apply to you, circle "0".

Family/home responsibilities. This category refers to activities related to the home or family. It includes chores and duties performed around the house (e.g., yard work) and errands or favours for other family members (e.g. driving the children to school).

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Recreation. This category includes hobbies, sports and other similar leisure time activities.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Social activity. This category refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, theatre, concerts, dining out and other social functions.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Occupation. This category refers to activities that are a part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer worker.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Sexual behaviour. This category refers to the frequency and quality of one's sex life.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Self-care. This category includes activities that involve personal maintenance and independent daily living (e.g., taking a shower, driving, getting dressed, etc.).

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

Life-support activity. This category refers to basic life supporting behaviours such as eating, sleeping and breathing.

0 1 2 3 4 5 6 7 8 9 10
no disability — mild — moderate — severe — total disability

VISUAL ANALOGUE SCALE

On a scale of 0-10 (where 0 is no pain and 10 is unbearable pain, the worst pain you can imagine), mark where your pain is most of the time.

0 — 10
no pain — unbearable pain

MH-158

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R-03-02

APPENDIX R
SICKNESS IMPACT PROFILE

Sickness Impact Profile

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MARILYN BERGNER

SIP-10030
SD I-03564
SD II-03657

THE FOLLOWING INSTRUCTIONS ARE FOR THE SELF-ADMINISTERED QUESTIONNAIRE

PLEASE READ THE ENTIRE INTRODUCTION BEFORE YOU READ THE QUESTIONNAIRE. IT IS VERY IMPORTANT THAT EVERYONE TAKING THE QUESTIONNAIRE FOLLOWS THE SAME INSTRUCTIONS.

INTRODUCTION TO RESPONDENT

You have certain activities that you do in carrying on your life. Sometimes you do all of these activities. Other times, because of your state of health, you don't do these activities in the usual way; you may cut some out; you may do some for shorter lengths of time; you may do some in different ways. These changes in your activities might be recent or longstanding. We are interested in learning about any changes that describe you today and are related to your state of health.

The questionnaire booklet lists statements that people have told us describe them when they are not completely well. Whether or not you consider yourself sick, there may be some statements that will stand out because they describe you today and are related to your state of health. As you read the questionnaire, think of yourself today. When you read a statement that you are sure describes you and is related to your health, place a check on the line to the right of the statement. For example:

I am not driving my car ___✓___ (026-031)

If you have not been driving for some time because of your health, and are still not driving today, you should respond to this statement.

On the other hand, if you never drive or are not driving today because your car is being repaired, the statement, "I am not driving my car" is not related to your health and you should not check it. If you simply are driving less or are driving shorter distances, and feel that the statement only partially describes you, do not check it. In all of these cases you would leave the line to the right of the statement blank. For example:

I am not driving my car ____ (026-031)

Remember that we want you to check this statement only if you are sure it describes you today and is related to your state of health.

Read the introduction to each group of statements and then consider the statements in the order listed. While some of the statements may not apply to you, we ask that you please read all of them. Check those that describe you as you go along. Some of the statements will differ only in a few words, so please read each one carefully. While you may go back to change a response, your first answer is usually the best. Please do not read ahead in the booklet.

Once you have started the questionnaire, it is very important that you complete it within one day (24 hours).

If you find it hard to keep your mind on the statements, take a short break and then continue. When you have read all of the statements on a page, put a check in the BOX in the lower right-hand corner. If you have any questions, please refer to these instructions.

Please do not discuss the statements with anyone, including family members, while doing the questionnaire.

Now turn to the questionnaire booklet and read the statements. Remember we are interested in the recent or longstanding changes in your activities that are related to your health.

(SR-0499)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

1.	I spend much of the day lying down in order to rest	_____ (070-083)
2.	I sit during much of the day	_____ (062-049)
3.	I am sleeping or dozing most of the time - day and night	_____ (063-104)
4.	I lie down more often during the day in order to rest	_____ (066-058)
5.	I sit around half-asleep	_____ (065-084)
6.	I sleep less at night, for example, wake up too early, don't fall asleep for a long time, awaken frequently	_____ (069-061)
7.	I sleep or nap more during the day	_____ (071-060)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(E8-0705)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I say how bad or useless I am, for example, that I am a burden on others _____ (274-087)
2. I laugh or cry suddenly _____ (272-068)
3. I often moan and groan in pain or discomfort _____ (269-069)
4. I have attempted suicide _____ (281-132)
5. I act nervous or restless _____ (284-046)
6. I keep rubbing or holding areas of my body that hurt or are uncomfortable _____ (262-062)
7. I act irritable and impatient with myself, for example, talk badly about myself, swear at myself, blame myself for things that happen _____ (273-078)
8. I talk about the future in a hopeless way _____ (283-089)
9. I get sudden frights _____ (278-074)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(SCM-2003)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I make difficult moves with help, for example, getting into or out of cars, bathtubs _____ (168-084)
2. I do not move into or out of bed or chair by myself but am moved by a person or mechanical aid _____ (170-121)
3. I stand only for short periods of time _____ (155-072)
4. I do not maintain balance _____ (146-098)
5. I move my hands or fingers with some limitation or difficulty _____ (152-064)
6. I stand up only with someone's help _____ (165-100)
7. I kneel, stoop, or bend down only by holding on to something _____ (171-064)
8. I am in a restricted position all the time _____ (158-125)
9. I am very clumsy in body movements _____ (148-058)
10. I get in and out of bed or chairs by grasping something for support or using a cane or walker _____ (169-082)
11. I stay lying down most of the time _____ (162-113)
12. I change position frequently _____ (147-030)
13. I hold on to something to move myself around in bed _____ (143-086)
14. I do not bathe myself completely, for example, require assistance with bathing _____ (310-089)

(CONTINUED FROM PAGE 8)

15.	I do not bathe myself at all, but am bathed by someone else	_____ (312-115)
16.	I use bedpan with assistance	_____ (292-114)
17.	I have trouble getting shoes, socks, or stockings on	_____ (305-057)
18.	I do not have control of my bladder	_____ (290-124)
19.	I do not fasten my clothing, for example, require assistance with buttons, zippers, shoelaces	_____ (298-074)
20.	I spend most of the time partly undressed or in pyjamas	_____ (302-074)
21.	I do not have control of my bowels	_____ (295-128)
22.	I dress myself, but do so very slowly	_____ (300-043)
23.	I get dressed only with someone's help	_____ (297-088)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(HM-0668)

THIS GROUP OF STATEMENTS HAS TO DO WITH ANY WORK YOU USUALLY DO IN CARING FOR YOUR HOME OR YARD. CONSIDERING JUST THOSE THINGS THAT YOU DO, PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I do work around the house only for short periods of time or rest often _____ (117-054)

2. I am doing less of the regular daily work around the house than I would usually do _____ (119-044)

3. I am not doing any of the regular daily work around the house that I would usually do _____ (120-086)

4. I am not doing any of the maintenance or repair work that I would usually do in my home or yard _____ (001-062)

5. I am not doing any of the shopping that I would usually do _____ (106-071)

6. I am not doing any of the house cleaning that I would usually do _____ (116-077)

7. I have difficulty doing handwork, for example, turning faucets, using kitchen gadgets, sewing, carpentry _____ (107-069)

8. I am not doing any of the clothes washing that I would usually do _____ (111-077)

9. I am not doing heavy work around the house _____ (115-044)

(CONTINUED FROM PAGE 10)

10. I have given up taking care of personal or household business affairs, for example, paying bills, banking, working on budget _____(105-084)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(M-0719)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I am getting around only within one building _____(134-066)
2. I stay within one room _____(128-106)
3. I am staying in bed more _____(130-081)
4. I am staying in bed most of the time _____(131-109)
5. I am not now using public transportation _____(140-041)
6. I stay home most of the time _____(133-066)
7. I am only going to places with restrooms nearby _____(125-056)
8. I am not going into town _____(124-048)
9. I stay away from home only for brief periods of time _____(139-054)
10. I do not get around in the dark or in unlit places without someone's help _____(121-072)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(SI-1450)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I am going out less to visit people _____ (028-044)
2. I am not going out to visit people at all _____ (029-101)
3. I show less interest in other people's problems for example, don't listen when they tell me about their problems, don't offer to help _____ (003-067)
4. I often act irritable toward those around me, for example, snap at people, give sharp answers, criticize easily _____ (015-084)
5. I show less affection _____ (007-052)
6. I am doing fewer social activities with groups of people _____ (012-036)
7. I am cutting down the length of visits with friends _____ (027-043)
8. I am avoiding social visits from others _____ (034-080)
9. My sexual activity is decreased _____ (039-051)
10. I often express concern over what might be happening to my health _____ (018-052)
11. I talk less with those around me _____ (002-056)
12. I make demands, for example, insist that people do things for me, tell me how to do things _____ (038-088)
13. I stay alone much of the time _____ (023-086)

(CONTINUED FROM PAGE 13)

14. I act disagreeable to family members, for example, I act spiteful, I am stubborn _____ (249-088)

15. I have frequent outbursts of anger at family members, for example, strike at them, scream, throw things at them _____ (240-119)

16. I isolate myself as much as I can from the rest of the family _____ (237-102)

17. I am paying less attention to the children _____ (238-064)

18. I refuse contact with family members, for example, turn away from them _____ (256-115)

19. I am not doing the things I usually do to take care of my children or family _____ (242-079)

20. I am not joking with family members as I usually do _____ (255-043)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(A-0842)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

1.	I walk shorter distances or stop to rest often	_____ (050-048)
2.	I do not walk up or down hills	_____ (046-056)
3.	I use stairs only with mechanical support, for example, handrail, cane, crutches	_____ (042-067)
4.	I walk up or down stairs only with assistance from someone else	_____ (044-076)
5.	I get around in a wheelchair	_____ (057-096)
6.	I do not walk at all	_____ (052-105)
7.	I walk by myself but with some difficulty, for example, limp, wobble, stumble, have stiff leg	_____ (049-055)
8.	I walk only with help from someone	_____ (053-088)
9.	I go up and down stairs more slowly, for example, one step at a time, stop often	_____ (040-054)
10.	I do not use stairs at all	_____ (041-083)
11.	I get around only by using a walker, crutches, cane, walls or furniture	_____ (047-079)
12.	I walk more slowly	_____ (051-035)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(AB-0777)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I am confused and start several actions at a time _____ (223-090)
2. I have more minor accidents, for example, drop things, trip and fall, bump into things _____ (234-075)
3. I react slowly to things that are said or done _____ (228-059)
4. I do not finish things I start _____ (227-067)
5. I have difficulty reasoning and solving problems, for example, making plans, making decisions, learning new things _____ (224-084)
6. I sometimes behave as if I were confused or disoriented in place or time, for example, where I am, who is around, directions, what day it is _____ (231-113)
7. I forget a lot, for example, things that happened recently, where I put things, appointments _____ (222-078)
8. I do not keep my attention on any activity for long _____ (220-067)
9. I make more mistakes than usual _____ (225-084)
10. I have difficulty doing activities involving concentration and thinking _____ (217-080)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(C-0725)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I am having trouble writing or typing _____(191-070)
2. I communicate mostly by gestures, for example, moving head, pointing, sign language _____(177-102)
3. My speech is understood only by a few people who know me well _____(179-093)
4. I often lose control of my voice when I talk, for example, my voice gets louder or softer, trembles, changes unexpectedly _____(197-083)
5. I don't write except to sign my name _____(188-083)
6. I carry on a conversation only when very close to the other person or looking at him _____(178-067)
7. I have difficulty speaking, for example, get stuck, stutter, stammer, slur my words _____(176-076)
8. I am understood with difficulty _____(200-087)
9. I do not speak clearly when I am under stress _____(201-064)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

THE NEXT GROUP OF STATEMENTS HAS TO DO WITH ANY WORK YOU USUALLY DO OTHER THAN MANAGING YOUR HOME. BY THIS WE MEAN ANYTHING THAT YOU REGARD AS WORK THAT YOU DO ON A REGULAR BASIS.

DO YOU USUALLY DO WORK OTHER THAN MANAGING YOUR HOME?

_____ YES _____ NO

IF YOU ANSWERED YES, GO ON TO THE NEXT PAGE.

IF YOU ANSWERED NO:

ARE YOU RETIRED?

_____ YES _____ NO

IF YOU ARE RETIRED, WAS YOUR RETIREMENT RELATED TO YOUR HEALTH?

_____ YES _____ NO

IF YOU ARE NOT RETIRED, BUT ARE NOT WORKING, IS THIS RELATED TO YOUR HEALTH?

_____ YES _____ NO

NOW SKIP THE NEXT PAGE.

(W-0515)

IF YOU ARE NOT WORKING AND IT IS NOT BECAUSE OF YOUR HEALTH, PLEASE SKIP THIS PAGE.

NOW CONSIDER THE WORK YOU DO AND RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH. (IF TODAY IS A SATURDAY OR SUNDAY OR SOME OTHER DAY THAT YOU WOULD USUALLY HAVE OFF, PLEASE RESPOND AS IF TODAY WERE A WORKING DAY.)

---

1. I am not working at all _____ (100-361)

   (IF YOU CHECKED THIS STATEMENT, SKIP TO THE NEXT PAGE.)

2. I am doing part of my job at home _____ (094-037)

3. I am not accomplishing as much as usual at work _____ (096-055)

4. I often act irritable toward my work associates, for example, snap at them, give sharp answers, criticize easily _____ (088-080)

5. I am working shorter hours _____ (095-043)

6. I am doing only light work _____ (086-050)

7. I work only for short periods of time or take frequent rests _____ (090-061)

(CONTINUED FROM PAGE 19)

8. I am working at my usual job but with some changes, for example, using different tools or special aids, trading some tasks with other workers _____ (092-034)

9. I do not do my job as carefully and accurately as usual _____ (097-062)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(RP-0422)

THIS GROUP OF STATEMENTS HAS TO DO WITH ACTIVITIES YOU USUALLY DO IN YOUR FREE TIME. THESE ACTIVITIES ARE THINGS THAT YOU MIGHT DO FOR RELAXATION, TO PASS THE TIME, OR FOR ENTERTAINMENT. PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

---

1. I do my hobbies and recreation for shorter periods of time _____ (215-039)

2. I am going out for entertainment less often _____ (214-036)

3. I am cutting down on some of my usual inactive recreation and pastimes, for example, watching TV, playing cards, reading _____ (207-059)

4. I am not doing any of my usual inactive recreation and pastimes, for example, watching TV, playing cards, reading _____ (208-084)

5. I am doing more inactive pastimes in place of my other usual activities _____ (210-043)

6. I am doing fewer community activities _____ (216-033)

7. I am cutting down on some of my usual physical recreation or activities _____ (210-043)

8. I am not doing any of my usual physical recreation or activities _____ (111-077)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

(E-0705)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

1.	I am eating much less than usual	_____ (065-037)
2.	I feed myself but only by using specially prepared food or utensils	_____ (073-077)
3.	I am eating special or different food, for example, soft food bland diet, low-salt, low-fat, low-sugar	_____ (081-043)
4.	I eat no food at all but am taking fluids	_____ (077-104)
5.	I just pick or nibble at my food	_____ (083-059)
6.	I am drinking less fluids	_____ (080-036)
7.	I feed myself with help from someone else	_____ (074-099)
8.	I do not feed myself at all, but must be fed	_____ (075-117)
9.	I am eating no food at all, nutrition is taken through tubes or intravenous fluids	_____ (076-133)

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE ☐

OCCUPATIONAL PERFORMANCE ANALYSIS UNIT
Department of Occupational Therapy
University of Alberta

SICKNESS IMPACT PROFILE SCORE SHEET

	CLIENT'S SCORE		TOTAL POSSIBLE DYSFUNCTION		
PHYSICAL DIMENSION					
Ambulation	_____	÷	84.2	X 100 = _____	%
Mobility	_____	÷	71.9	X 100 = _____	%
Body care & movement	_____	÷	200.3	X 100 = _____	%
Dimension total	_____	÷	356.4	X 100 = _____	%
PSYCHOSOCIAL DIMENSION					
Social interaction	_____	÷	145.0	X 100 = _____	%
Alertness behaviour	_____	÷	77.7	X 100 = _____	%
Emotional behaviour	_____	÷	70.5	X 100 = _____	%
Communication	_____	÷	72.5	X 100 = _____	%
Dimension total	_____	÷	365.7	X 100 = _____	%
INDEPENDENT CATEGORIES					
Sleep & rest	_____	÷	49.9	X 100 = _____	%
Eating	_____	÷	70.5	X 100 = _____	%
Work	_____	÷	51.5	X 100 = _____	%
Home management	_____	÷	66.8	X 100 = _____	%
Recreation/pastimes	_____	÷	42.2	X 100 = _____	%
OVERALL SCORE	_____ Sum of 12 categories	÷	1003.0 total SIP score	X 100 = _____	%

APPENDIX S
FUNCTIONAL CAPACITY EVALUATION FORM

FUNCTIONAL CAPACITY EVALUATION

Millard Health

Service Line_____ Program _____

Heart rate: maximum_____

resting _____

FLOOR TO WAIST LIFT: 5 safe repetitions to pass

1st day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time
2nd day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time

WAIST TO CROWN LEVEL LIFT – HANDS ON HANDLES: 5 safe repetitions to pass

1st day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time
2nd day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time

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WAIST TO CROWN LEVEL LIFT – OVERHAND/UNDERHAND GRIP: 5 safe reps. to pass

1st day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time
2nd day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time

HORIZONTAL LIFT: 5 safe repetitions to pass

1st day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time
2nd day	_____ lbs	_____ lbs	_____ lbs	_____ lbs	_____ lbs
	_____ hr	_____ hr	_____ hr	_____ hr	_____ hr
	_____ time	_____ time	_____ time	_____ time	_____ time

PUSH – STATIC FORCE

1st day	#1 _____ lbs		2nd day	#1 _____ lbs
	#2 _____ lbs	Average _____ lbs.		#2 _____ lbs Average _____ lbs
	#3 _____ lbs	Power leg _____		#3 _____ lbs Power leg _____

PUSH – DYNAMIC FORCE: weight sled 30 feet – loaded heavily

APPENDIX T
RAW DATA

	id	group	lpredicted	lactual	low	lowperce	loweff
1	1.0	experiment	60.0	80.0	-20.0	75.0	maximum
2	2.0	experiment	40.0	20.0	20.0	200.0	light
3	3.0	experiment	50.0	45.0	-5.0	90.0	moderate
4	4.0	experiment	50.0	91.6	-41.6	55.0	maximum
5	5.0	experiment	55.0	65.0	-10.0	85.0	maximum
6	6.0	experiment	21.5	35.0	-13.5	61.0	maximum
7	7.0	experiment	50.0	76.5	-26.5	65.0	maximum
8	8.0	experiment	40.0	60.0	-20.0	67.0	maximum
9	9.0	experiment	40.0	45.0	-5.0	89.0	maximum
10	10.0	experiment	10.0	26.5	-16.5	38.0	moderate
11	11.0	experiment	35.0	46.6	-11.6	75.0	maximum
12	12.0	experiment	.0	43.5	-43.5	.0	maximum
13	13.0	experiment	35.0	35.0	.0	100.0	moderate
14	14.0	experiment	60.0	101.6	-41.6	59.0	maximum
15	15.0	experiment	60.0	75.0	-15.0	80.0	maximum
16	16.0	experiment	60.0	46.6	13.4	129.0	maximum
17	17.0	experiment	50.0	55.0	-5.0	91.0	maximum
18	18.0	experiment	30.0	36.6	-6.6	82.0	moderate
19	19.0	experiment	35.0	47.5	-12.5	74.0	maximum
20	20.0	experiment	25.0	16.5	8.5	151.0	light
21	21.0	experiment	100.0	91.5	8.5	109.0	maximum
22	22.0	experiment	40.0	45.0	-5.0	89.0	maximum
23	23.0	experiment	10.0	20.0	-10.0	50.0	moderate
24	24.0	experiment	50.0	70.0	-20.0	71.0	maximum
25	25.0	experiment	20.0	24.0	-4.0	83.0	maximum
26	26.0	experiment	10.0	45.0	-35.0	22.0	moderate
27	27.0	experiment	40.0	20.0	20.0	200.0	moderate
28	28.0	experiment	50.0	25.0	25.0	200.0	light
29	29.0	experiment	35.0	44.0	-9.0	80.0	moderate
30	30.0	experiment	50.0	50.0	.0	100.0	maximum
31	31.0	experiment	25.0	42.5	-17.5	59.0	maximum
32	32.0	experiment	20.0	31.6	-11.6	63.0	moderate
33	33.0	experiment	15.0	36.6	-21.6	41.0	moderate
34	34.0	experiment	25.0	55.0	-30.0	45.0	maximum
35	35.0	experiment	25.0	19.1	5.9	131.0	light
36	36.0	experiment	30.0	44.1	-14.1	68.0	maximum
37	37.0	experiment	25.0	29.1	-4.1	86.0	light
38	38.0	experiment	55.0	96.6	-41.6	57.0	maximum
39	39.0	experiment	65.0	66.5	-1.5	98.0	maximum

	id	group	lpredicted	lactual	low	lowperce	loweff
40	40.0	experiment	15.0	30.0	-15.0	50.0	moderate
41	41.0	experiment	11.0	14.1	-3.1	78.0	light
42	42.0	experiment	20.0	30.0	-10.0	67.0	moderate
43	43.0	control	30.0	50.0	-20.0	60.0	maximum
44	44.0	control	25.0	40.0	-15.0	62.5	maximum
45	45.0	control	25.0	30.0	-5.0	83.0	maximum
46	46.0	control	80.0	100.0	-20.0	80.0	maximum
47	47.0	control	80.0	56.6	23.4	141.0	maximum
48	48.0	control	120.0	101.6	18.4	118.0	maximum
49	49.0	control	30.0	45.0	-15.0	66.0	maximum
50	50.0	control	50.0	42.5	7.5	118.0	maximum
51	51.0	control	100.0	75.0	25.0	133.0	maximum
52	52.0	control	70.0	86.6	-16.6	81.0	maximum
53	53.0	control	50.0	70.0	-20.0	71.0	maximum
54	54.0	control	50.0	85.0	-35.0	59.0	maximum
55	55.0	control	150.0	80.0	70.0	188.0	maximum
56	56.0	control	30.0	40.0	-45.0	53.0	maximum
57	57.0	control	80.0	75.0	5.0	106.0	maximum
58	58.0	control	50.0	60.0	-10.0	83.0	maximum
59	59.0	control	50.0	45.0	5.0	111.0	maximum
60	60.0	control	50.0	85.0	-35.0	59.0	maximum
61	61.0	control	100.0	35.0	65.0	286.0	maximum
62	62.0	control	36.0	60.0	-24.0	60.0	maximum
63	63.0	control	41.0	80.0	-39.0	51.0	maximum
64	64.0	control	90.0	60.0	30.0	150.0	maximum
65	65.0	control	130.0	100.0	30.0	130.0	maximum
66	66.0	control	50.0	95.0	-45.0	53.0	maximum
67	67.0	control	35.0	45.0	-10.0	78.0	maximum
68	68.0	control	75.0	95.0	-25.0	74.0	maximum
69	69.0	control	30.0	35.0	-5.0	86.0	maximum
70	70.0	control	80.0	95.0	-15.0	84.0	maximum
71	71.0	control	100.0	115.0	-15.0	87.0	maximum
72	72.0	control	80.0	72.5	7.3	110.0	maximum
73	73.0	control	85.0	95.0	-10.0	89.5	maximum
74	74.0	control	100.0	70.0	30.0	143.0	maximum
75	75.0	control	120.0	110.0	10.0	109.0	maximum
76	76.0	control	75.0	55.0	20.0	136.0	maximum
77	77.0	control	80.0	106.6	-26.6	75.0	maximum
78	78.0	control	80.0	111.6	-31.6	72.0	maximum
79	79.0	control	50.0	79.1	-29.1	63.0	maximum
80	80.0	control	10.0	36.6	-26.6	27.0	maximum

	wpredicted	wactual	waist	waistper	waisteff	cpredicted	cactual
1	70.0	100.0	-30.0	57.0	maximum	40.0	70.0
2	35.0	22.5	12.5	156.0	light	25.0	22.5
3	50.0	65.0	-15.0	77.0	maximum	35.0	35.0
4	60.0	111.6	-51.6	54.0	maximum	50.0	61.6
5	60.0	85.0	-25.0	71.0	maximum	45.0	65.0
6	26.0	55.0	-29.0	47.0	maximum	21.0	30.0
7	50.0	76.5	-26.5	65.0	maximum	50.0	36.5
8	50.0	90.0	-40.0	56.0	maximum	45.0	45.0
9	55.0	57.5	-2.5	96.0	maximum	30.0	39.1
10	21.0	31.5	-10.5	67.0	moderate	21.0	21.5
11	50.0	66.6	-16.6	75.0	maximum	60.0	41.6
12	45.0	76.6	-31.6	59.0	maximum	20.0	41.6
13	40.0	40.0	.0	100.0	moderate	10.0	20.0
14	60.0	101.6	-46.6	56.0	maximum	.0	.0
15	60.0	95.0	-35.0	63.0	maximum	50.0	50.0
16	40.0	74.1	-34.1	54.0	maximum	30.0	59.1
17	50.0	60.0	-10.0	83.0	maximum	40.0	40.0
18	35.0	41.6	-6.6	84.0	moderate	30.0	31.6
19	50.0	62.5	-12.5	80.0	maximum	30.0	37.5
20	60.0	61.5	-1.5	98.0	maximum	15.0	29.0
21	100.0	91.5	8.0	109.0	maximum	75.0	61.5
22	60.0	55.0	5.0	109.0	maximum	50.0	35.0
23	10.0	30.0	-20.0	33.0	moderate	10.0	15.0
24	60.0	80.0	-20.0	75.0	maximum	60.0	60.0
25	30.0	39.0	-9.0	77.0	maximum	10.0	24.0
26	50.0	65.0	-15.0	77.0	maximum	30.0	52.5
27	40.0	52.5	-12.5	76.0	maximum	20.0	10.0
28	50.0	25.0	25.0	200.0	moderate	45.0	25.0
29	40.0	81.5	-41.5	49.0	maximum	40.0	54.0
30	70.0	85.0	-15.0	82.0	maximum	50.0	27.5
31	35.0	57.5	-22.5	61.0	maximum	15.0	27.5
32	20.0	21.6	-1.6	92.0	moderate	20.0	29.1
33	20.0	36.6	-16.6	55.0	moderate	12.0	44.1
34	25.0	80.0	-55.0	31.0	maximum	25.0	40.0
35	25.0	41.6	-16.6	60.0	moderate	.0	36.6
36	40.0	64.1	-24.1	62.0	maximum	20.0	41.6
37	25.0	49.1	-24.1	51.0	moderate	25.0	31.6
38	55.0	66.6	-11.6	83.0	maximum	55.0	54.1
39	75.0	91.5	-16.5	82.0	maximum	35.0	41.5

	wpredicted	wactual	waist	waistper	waisteff	cpredicted	cactual
40	20.0	50.0	-30.0	40.0	maximum	20.0	30.0
41	16.0	19.1	-3.1	84.0	light	11.0	14.1
42	20.0	30.0	-10.0	67.0	maximum	15.0	20.0
43	30.0	47.5	-17.5	63.0	maximum	30.0	32.5
44	35.0	50.0	-15.0	70.0	maximum	25.0	35.0
45	25.0	42.5	-17.5	59.0	maximum	25.0	37.5
46	100.0	100.0	.0	100.0	maximum	50.0	65.0
47	100.0	91.6	8.4	109.0	maximum	60.0	54.1
48	130.0	121.6	8.4	107.0	maximum	60.0	61.6
49	40.0	50.0	-10.0	80.0	maximum	20.0	32.5
50	60.0	47.5	12.5	126.0	maximum	40.0	35.0
51	50.0	85.0	-35.0	59.0	maximum	50.0	50.0
52	100.0	101.6	-1.6	98.0	maximum	40.0	61.6
53	50.0	95.0	-45.0	53.0	maximum	35.0	55.0
54	30.0	95.0	-65.0	32.0	maximum	20.0	60.0
55	150.0	95.0	35.0	130.0	maximum	70.0	55.0
56	25.0	60.0	-55.0	48.0	maximum	20.0	50.0
57	60.0	85.0	-25.0	71.0	maximum	40.0	60.0
58	50.0	70.0	-20.0	71.0	maximum	40.0	60.0
59	65.0	50.0	15.0	130.0	maximum	40.0	35.0
60	50.0	85.0	-35.0	59.0	maximum	50.0	65.0
61	51.0	45.0	5.0	111.0	maximum	15.0	35.0
62	34.0	70.0	-36.0	49.0	maximum	32.0	50.0
63	34.0	95.0	-61.0	36.0	maximum	23.0	60.0
64	95.0	70.0	25.0	136.0	maximum	75.0	40.0
65	140.0	110.0	30.0	127.0	maximum	70.0	69.1
66	50.0	105.0	-55.0	48.0	maximum	50.0	60.0
67	40.0	53.0	-13.0	75.0	maximum	30.0	40.0
68	100.0	105.0	-5.0	95.0	maximum	50.0	60.0
69	30.0	47.5	-17.5	63.0	maximum	20.0	30.0
70	120.0	95.0	25.0	126.0	maximum	50.0	55.0
71	100.0	115.0	-15.0	87.0	maximum	50.0	77.5
72	55.0	100.0	-45.0	55.0	maximum	45.0	40.0
73	90.0	95.0	-5.0	95.0	maximum	35.0	50.0
74	80.0	80.0	.0	100.0	maximum	75.0	80.0
75	140.0	110.0	30.0	127.0	maximum	100.0	72.5
76	100.0	60.0	40.0	167.0	maximum	50.0	55.0
77	110.0	111.6	-1.6	99.0	maximum	40.0	56.6
78	100.0	111.6	-11.6	90.0	maximum	70.0	64.1
79	60.0	91.6	-31.6	66.0	maximum	25.0	51.6
80	15.0	36.6	-21.6	41.0	maximum	5.0	26.6

	crown	crownper	crowneff	pdi	vas	sip	sippsy
1	-30.0	70.0	maximum	8.0	2.0	.0	.0
2	2.5	111.0	light	47.0	6.5	22.3	34.4
3	.0	100.0	maximum	45.0	4.0	17.6	18.0
4	-11.6	81.0	maximum	.0	.0	9.9	6.8
5	-20.0	69.0	maximum	16.0	2.0	26.1	35.9
6	-9.0	70.0	maximum	20.0	3.0	5.7	8.1
7	13.5	137.0	maximum	18.0	3.0	9.1	5.1
8	.0	100.0	maximum	31.0	4.5	9.9	5.4
9	-9.1	77.0	maximum	11.0	2.5	4.9	3.1
10	-.5	98.0	moderate	35.0	7.0	30.5	44.5
11	18.4	144.0	maximum	7.0	1.0	2.4	1.7
12	-21.6	48.0	maximum	21.0	4.0	9.9	1.2
13	-10.0	50.0	moderate	56.0	7.5	11.4	10.9
14	.0	.0	maximum	18.0	1.0	20.6	30.7
15	.0	100.0	maximum	8.0	2.5	12.1	31.0
16	-29.1	51.0	maximum	43.0	7.0	20.7	22.8
17	.0	100.0	maximum	32.0	6.0	35.3	53.6
18	-1.6	95.0	moderate	22.0	4.0	12.9	11.8
19	-7.5	80.0	maximum	15.0	2.5	4.8	2.4
20	-14.0	52.0	maximum	9.0	3.0	8.8	10.9
21	13.5	122.0	maximum	26.0	4.5	20.7	22.6
22	15.0	143.0	maximum	12.0	2.0	11.7	8.3
23	-5.0	67.0	moderate	50.0	4.0	20.6	9.1
24	.0	100.0	maximum	23.0	3.5	10.1	5.3
25	-14.0	42.0	maximum	11.0	1.0	12.7	7.1
26	-22.5	67.0	maximum	58.0	10.0	24.1	18.4
27	10.0	200.0	maximum	35.0	3.0	19.6	17.9
28	20.0	180.0	light	38.0	5.0	18.6	17.6
29	-14.0	74.0	maximum	47.0	6.5	24.8	24.0
30	22.5	182.0	moderate	31.0	5.0	27.4	38.0
31	-12.5	55.0	maximum	16.0	2.5	8.8	7.2
32	-9.1	69.0	maximum	37.0	3.5	9.1	3.3
33	-34.1	27.0	maximum	32.0	9.0	.0	.0
34	-15.0	63.0	maximum	66.0	8.5	43.6	62.2
35	-39.9	.0	moderate	30.0	3.5	14.6	11.6
36	-21.6	48.0	maximum	15.0	2.5	4.8	1.7
37	-6.6	79.0	moderate	34.0	4.5	7.5	3.6
38	.9	102.0	maximum	35.0	5.0	1.4	.0
39	-6.5	84.0	maximum	20.0	2.0	6.4	5.7

	crown	crownper	crowneff	pdi	vas	sip	sippsy
40	-10.0	67.0	moderate	33.0	6.0	35.0	37.0
41	-3.1	78.0	light	53.0	8.0	22.0	12.0
42	-5.0	75.0	maximum	32.0	4.0	.0	.0
43	-2.5	92.0	maximum	.0	.0	6.5	10.5
44	-10.0	71.0	maximum	.0	.0	.0	.0
45	-12.5	67.0	maximum	.0	.0	2.5	3.0
46	-15.0	78.0	maximum	.0	.0	.0	.0
47	5.9	111.0	maximum	.0	.0	.0	.0
48	-1.6	97.0	maximum	1.0	.0	.0	.0
49	-12.5	62.0	maximum	3.0	.0	.0	.0
50	5.0	114.0	maximum	.0	.0	1.0	2.0
51	.0	100.0	maximum	.0	.0	3.6	3.4
52	-21.6	65.0	maximum	.0	.0	.0	.0
53	-20.0	64.0	maximum	.0	.0	.0	.0
54	-40.0	33.0	maximum	.0	.0	.0	.0
55	15.0	127.0	maximum	.0	.0	.0	.0
56	-10.0	83.0	maximum	.0	.0	.0	.0
57	-20.0	67.0	maximum	5.0	1.0	7.0	13.0
58	-20.0	67.0	maximum	.0	.0	1.0	.0
59	5.0	114.0	maximum	.0	.0	1.0	.0
60	-15.0	77.0	maximum	.0	.0	2.0	.0
61	-20.0	43.0	maximum	.0	.0	.0	.0
62	-18.0	64.0	maximum	.0	.0	.0	.0
63	-37.0	38.0	maximum	4.0	.0	.0	.0
64	35.0	186.0	maximum	.0	.0	1.0	.0
65	.9	101.0	maximum	.0	.0	.0	.0
66	.0	100.0	maximum	.0	.0	.0	.0
67	-10.0	75.0	maximum	1.0	.0	1.0	1.0
68	-10.0	83.0	maximum	.0	.0	.0	.0
69	-10.0	67.0	maximum	.0	.0	.0	.0
70	-5.0	91.0	maximum	.0	.0	.0	.0
71	-27.5	65.0	maximum	.0	.0	.0	.0
72	5.0	113.0	maximum	.0	.0	.0	.0
73	-15.0	70.0	maximum	.0	.0	.0	.0
74	-5.0	94.0	maximum	5.0	.0	.0	.0
75	27.5	138.0	maximum	.0	.0	.0	.0
76	-5.0	91.0	maximum	.0	.0	.0	.0
77	-16.6	71.0	maximum	.0	.0	.0	.0
78	5.9	109.0	maximum	.0	.0	.0	.0
79	-26.6	48.0	maximum	.0	.0	.0	.0
80	-21.6	20.0	maximum	.0	.0	.0	.0

	sipphys	sf36pcs	sf36mcs	sf36pf	sf36pfnb	sf36bp	sf36bn
1	.0	45.0	56.0	80.0	48.6	52.0	41.8
2	5.6	37.2	35.6	45.0	33.8	31.0	32.9
3	10.8	36.0	30.0	60.0	40.0	22.0	29.0
4	6.6	57.0	33.0	100.0	57.0	41.0	37.0
5	17.3	45.0	39.0	75.0	47.0	52.0	42.0
6	2.4	42.0	37.0	60.0	40.0	41.0	37.0
7	1.8	40.0	57.0	85.0	50.7	41.0	37.0
8	3.1	36.5	42.6	50.0	36.0	41.0	37.2
9	.8	48.3	59.6	85.0	50.7	74.0	51.0
10	11.3	49.0	16.4	80.0	48.6	41.0	37.2
11	.0	47.0	57.0	90.0	55.0	74.0	51.0
12	3.6	34.5	40.4	65.0	42.3	31.0	33.0
13	1.1	21.6	38.8	15.0	21.3	22.0	29.2
14	3.7	43.4	36.2	80.0	48.6	31.0	33.0
15	.0	49.6	42.2	85.0	50.7	62.0	46.1
16	9.8	30.0	33.6	40.0	31.8	22.0	29.2
17	16.2	36.7	24.2	40.0	31.8	41.0	37.2
18	5.9	39.6	36.4	60.0	42.3	52.0	41.8
19	.8	36.9	53.9	85.0	50.7	51.0	41.4
20	.0	42.2	55.8	75.0	46.5	51.0	41.4
21	10.7	35.1	43.6	60.0	40.2	32.0	33.4
22	4.1	47.3	55.6	80.0	48.6	62.0	51.6
23	14.4	32.6	38.6	45.0	36.0	32.0	33.0
24	4.2	39.6	42.2	80.0	48.6	72.0	33.0
25	13.8	39.5	56.6	80.0	48.6	62.0	47.0
26	22.7	31.8	31.2	30.0	31.8	55.0	24.9
27	7.5	27.2	55.5	60.0	40.2	22.0	29.2
28	11.2	35.5	40.7	65.0	42.3	41.0	37.2
29	17.1	33.0	38.8	65.0	42.3	22.0	29.2
30	13.2	30.5	40.1	55.0	38.1	22.0	29.2
31	1.0	47.0	44.0	70.0	44.0	52.0	42.0
32	9.7	25.9	57.3	40.0	31.8	22.0	29.2
33	.0	33.1	40.8	40.0	33.9	22.0	29.2
34	26.9	35.5	20.6	25.0	25.5	12.0	24.9
35	10.7	42.2	35.4	60.0	40.2	52.0	41.8
36	.0	50.0	58.2	85.0	50.7	72.0	50.3
37	2.2	38.2	54.9	50.0	36.0	31.0	33.0
38	.0	48.0	55.0	95.0	54.9	74.0	51.0
39	.0	34.6	60.7	80.0	48.6	52.0	46.8

	sipphys	sf36pcs	sf36mcs	sf36pf	sf36pfnb	sf36bp	sf36bn
40	26.0	36.6	35.2	35.0	29.7	31.0	33.0
41	27.0	15.6	46.7	5.0	17.0	12.0	24.9
42	.0	41.0	36.0	55.0	38.0	52.0	42.0
43	.0	60.0	57.0	100.0	57.0	100.0	62.0
44	.0	58.9	56.7	100.0	57.0	100.0	62.1
45	.0	49.8	44.3	95.0	54.9	74.0	51.1
46	.0	58.7	62.3	100.0	57.0	100.0	62.1
47	.0	59.0	54.5	100.0	57.0	84.0	55.4
48	.0	.	.	.	.	.	.
49	.0	53.3	60.5	90.0	52.8	85.0	55.4
50	.0	57.3	59.5	100.0	57.0	100.0	62.1
51	2.5	55.2	48.2	90.0	52.8	100.0	62.1
52	.0	60.0	54.0	100.0	57.0	100.0	62.0
53	.0	49.9	57.6	95.0	54.9	74.0	45.6
54	.0	60.2	37.0	95.0	57.0	61.0	55.4
55	.0	58.6	52.7	100.0	57.0	84.0	62.1
56	.0	55.3	59.6	100.0	54.9	100.0	51.1
57	.0	64.2	29.7	95.0	55.0	74.0	51.0
58	.0	56.0	53.0	100.0	57.0	100.0	62.0
59	.0	58.0	49.0	100.0	57.0	84.0	55.0
60	.0	57.0	56.0	100.0	57.0	100.0	62.0
61	.0	57.0	40.0	100.0	57.0	100.0	62.0
62	.0	56.0	52.0	95.0	55.0	90.0	54.0
63	.0	52.0	59.0	90.0	53.0	84.0	55.0
64	.0	55.0	61.0	100.0	57.0	84.0	55.0
65	.0	57.0	61.0	100.0	57.0	84.0	55.0
66	.0	55.0	60.0	95.0	55.0	74.0	51.0
67	.0	57.0	60.0	100.0	57.0	74.0	51.0
68	.0	59.0	57.0	100.0	57.0	100.0	62.0
69	.0	56.0	57.0	100.0	57.0	54.0	55.0
70	.0	56.0	55.0	100.0	57.0	84.0	55.0
71	.0	58.0	58.0	100.0	57.0	100.0	62.0
72	.0	51.0	59.0	90.0	53.0	84.0	55.0
73	.0	60.0	55.0	100.0	57.0	100.0	62.0
74	.0	52.0	51.0	90.0	53.0	62.0	46.0
75	.0	59.0	57.0	100.0	57.0	100.0	62.0
76	.0	57.0	59.0	100.0	57.0	100.0	62.0
77	.0	59.0	62.0	100.0	57.0	100.0	62.0
78	.0	54.0	56.0	100.0	57.0	84.0	55.0
79	.0	59.0	61.0	100.0	57.0	100.0	62.0
80	.0	60.0	52.0	100.0	57.0	100.0	62.0

	sf36ghp	sf36gn	sf36vit	sf36vn	age	gender	filter_$
1	67.0	48.1	56.0	49.0	53.0	male	Selected
2	62.0	45.8	44.0	42.7	36.0	male	Selected
3	45.0	37.7	38.0	39.6	40.0	male	Selected
4	77.0	53.0	50.0	46.0	34.0	male	Selected
5	67.0	48.0	38.0	49.0	47.0	male	Selected
6	67.0	48.0	25.0	33.0	45.0	female	Selected
7	77.0	53.0	56.0	49.0	46.0	male	Selected
8	57.0	43.4	56.0	48.9	30.0	male	Selected
9	87.0	57.7	88.0	61.5	31.0	female	Selected
10	50.0	40.0	25.0	33.6	21.0	female	Selected
11	72.0	50.5	63.0	52.0	24.0	female	Selected
12	72.0	50.6	31.0	36.5	52.0	female	Selected
13	25.0	28.2	6.0	24.0	62.0	male	Selected
14	77.0	53.0	44.0	43.0	30.0	male	Selected
15	67.0	42.2	50.0	45.9	38.0	male	Selected
16	35.0	33.0	31.0	36.5	47.0	male	Selected
17	20.0	25.8	25.0	33.6	40.0	male	Selected
18	45.0	37.7	44.0	45.8	20.0	male	Selected
19	57.0	43.4	56.0	49.0	26.0	male	Selected
20	75.0	52.0	69.0	55.2	41.0	male	Selected
21	72.0	50.6	31.0	36.5	28.0	male	Selected
22	77.0	52.9	75.0	58.3	37.0	male	Selected
23	32.0	26.7	25.0	33.4	46.0	female	Selected
24	72.0	50.6	50.0	46.0	47.0	male	Selected
25	62.0	46.0	50.0	46.0	53.0	female	Selected
26	55.0	42.5	50.0	46.0	38.0	male	Selected
27	62.0	45.8	56.0	49.0	26.0	female	Selected
28	72.0	50.6	31.0	36.5	46.0	male	Selected
29	72.0	50.6	38.0	39.6	27.0	male	Selected
30	47.0	38.6	31.0	36.5	33.0	male	Selected
31	87.0	58.0	63.0	49.0	40.0	female	Selected
32	65.0	46.0	38.0	39.6	42.0	female	Selected
33	42.0	36.2	50.0	45.8	51.0	male	Selected
34	60.0	44.8	25.0	33.4	31.0	male	Selected
35	45.0	37.7	50.0	45.8	44.0	male	Selected
36	77.0	52.9	75.0	58.3	23.0	female	Selected
37	100.0	63.9	75.0	58.3	40.0	male	Selected
38	67.0	48.2	50.0	45.8	34.0	male	Selected
39	67.0	48.2	75.0	58.3	29.0	female	Selected

	sf36ghp	sf36gn	sf36vit	sf36vn	age	gender	filter_$
40	60.0	44.8	68.0	55.2	47.0	male	Selected
41	30.0	30.5	31.0	36.5	33.0	male	Selected
42	57.0	43.0	50.0	46.0	56.0	female	Selected
43	100.0	64.0	81.0	62.0	25.0	female	Not Selecte
44	92.0	60.1	75.0	58.3	40.0	female	Not Selecte
45	67.0	48.2	56.3	49.0	36.0	female	Not Selecte
46	97.0	62.5	100.0	70.8	32.0	male	Not Selecte
47	100.0	63.9	75.0	58.3	32.0	male	Not Selecte
48	.	.	.	.	32.0	male	Not Selecte
49	82.0	55.3	81.0	61.5	34.0	female	Not Selecte
50	90.0	59.1	94.0	67.7	22.0	female	Not Selecte
51	52.0	41.0	50.0	45.8	33.0	male	Not Selecte
52	95.0	62.0	63.0	52.0	30.0	male	Not Selecte
53	97.0	45.8	87.5	58.3	.	male	Not Selecte
54	62.0	59.1	75.0	42.7	30.0	male	Not Selecte
55	90.0	60.1	44.0	52.1	25.0	male	Not Selecte
56	92.0	62.5	63.0	62.5	23.0	male	Not Selecte
57	92.0	62.0	56.0	49.0	41.0	female	Not Selecte
58	67.0	48.0	56.0	49.0	47.0	male	Not Selecte
59	85.0	57.0	56.0	49.0	43.0	female	Not Selecte
60	72.0	51.0	69.0	55.0	27.0	male	Not Selecte
61	62.0	46.0	38.0	40.0	29.0	female	Not Selecte
62	82.0	55.0	56.0	49.0	24.0	male	Not Selecte
63	72.0	51.0	75.0	58.0	40.0	male	Not Selecte
64	85.0	53.0	94.0	68.0	52.0	male	Not Selecte
65	100.0	64.0	81.0	62.0	28.0	male	Not Selecte
66	97.0	62.0	88.0	65.0	23.0	male	Not Selecte
67	100.0	64.0	94.0	68.0	31.0	female	Not Selecte
68	95.0	62.0	81.0	62.0	30.0	male	Not Selecte
69	85.0	57.0	75.0	58.0	32.0	female	Not Selecte
70	82.0	55.0	63.0	52.0	34.0	male	Not Selecte
71	82.0	55.0	81.0	62.0	28.0	male	Not Selecte
72	57.0	43.0	75.0	58.0	44.0	male	Not Selecte
73	97.0	63.0	75.0	58.0	34.0	male	Not Selecte
74	72.0	51.0	63.0	52.0	54.0	male	Not Selecte
75	92.0	60.0	81.0	61.0	46.0	male	Not Selecte
76	82.0	55.0	88.0	65.0	26.0	male	Not Selecte
77	100.0	64.0	94.0	68.0	26.0	male	Not Selecte
78	72.0	51.0	63.0	52.0	33.0	male	Not Selecte
79	100.0	64.0	88.0	65.0	29.0	female	Not Selecte
80	87.0	58.0	81.0	61.0	28.0	female	Not Selecte